

# Standards of care of diabetic patients in a typical English community

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## SUMMARY

**Background.** Poole has a well-established system of sharing care of patients with diabetes between hospital and general practitioners. Very few comprehensive audits of the effectiveness of such a system, which is being adopted in many areas of the UK, have been carried out.

**Aim.** A study was set up to survey structure, process and outcome of care for as many diabetic patients in the Poole area as possible, and to feed the results back to individual practices.

**Method.** Structure criteria were assessed by self-completion questionnaire. Process and outcome criteria were assessed by visits to practices and examination of individual patient notes. A total of 37 practices were visited and the notes of 3974 patients reviewed. Results were analysed by practice and for the district as a whole, and were sent to each practice for comparison.

**Results.** The overall prevalence of diabetes in the area was 1.61%, with a marked preponderance of elderly patients (14.1% were over 80). The overall male to female ratio was 1.2:1. The structure questionnaire pinpointed deficiencies in audit facilities, completeness of diabetic registers, and in general use of optometrists and chiropodists. Process criteria analysis showed that, within the last 13 months, 44% of patients under sole care of a general practitioner had undergone full eye examination, cholesterol levels had been checked in 25%, smoking status in 50%, and some foot inspection had been carried out in 57%. Glycaemic control and blood pressure had been measured in over 75% of patients. Outcome analysis showed, in those patients in which they were measured, mean glycosylated haemoglobin (HbA<sub>1c</sub>) to be 8.07% (upper limit of normal, ULN = 6.5%), some degree of retinopathy to be present in 17.3%, hypertension in 27%, and hypercholesterolaemia in 33%.

**Conclusion.** Standards of care of diabetics by general practitioners in the Poole area are not optimal, although they are as good as those reported for other districts. Glycaemic control was generally poor, especially in those patients needing insulin to control the disease. Vascular disease risk factors need to be targeted, and eye examination systems and chiropody services improved.

**Keywords:** diabetes; standards of care; audit.

## Introduction

THERE is widespread agreement about the type of care that general practitioners should be offering to their diabetic patients.<sup>1-3</sup> Guidelines are available on how to audit the standard of care.<sup>4</sup> Many surveys and/or audits of diabetes in the primary

care sector have been undertaken,<sup>5-10</sup> the results of which have varied: some have shown standards of care comparable to those available in hospital clinics,<sup>6,9,10</sup> others have indicated that the standard of care is poor.<sup>5,7,8</sup> Since the inception of the community care scheme in 1972, diabetic care in the Poole district has relied on the general practitioner to follow up most of their non-insulin dependent diabetic patients.<sup>11</sup> In this scheme, all newly diagnosed diabetics are initially assessed, educated and their condition stabilized in the hospital diabetes centre. They are then discharged to the care of their general practitioner, who is given instructions as to future follow-up. Patients are referred back to the hospital if problems develop.

Several studies of specific aspects of diabetes have been carried out in the Poole area.<sup>12-14</sup> This study is the first to audit diabetic care within the whole community. An integral part of the study was to feed back results to individual practices, enabling them to make comparisons between their performance and that of the district as a whole.

## Method

At a meeting in 1991 of the Poole Diabetes Health Care Club, a district-wide audit and survey of diabetic care was agreed upon. Consent forms were sent to all practices in the Poole area, and to those practices outside the area which regularly send diabetic patients to the Poole clinic: a total of 51 practices. Out of the practices contacted, 45 initially agreed to take part (88.2%).

### Structure questionnaire

A questionnaire regarding the structure of diabetic care was compiled using criteria from two principal sources,<sup>4,15</sup> broadly in keeping with the recommendations of the British Diabetic Association<sup>1</sup> and the Royal College of General Practitioners.<sup>2</sup> This questionnaire, which comprised 27 questions, was sent to all participating practices.

### Practice visits

At this stage, eight practices who filled in a questionnaire declined to take part in the second part of the study. Each of the 37 consenting practices was visited, and the notes of all known diabetic patients in each practice searched for information about diabetic care, according to agreed criteria. Practice visits were made between September 1992 and October 1993. At the visit, the details of the structure questionnaire were confirmed by interviews with the general practitioner who had completed it. To record a positive reply to any of the process or outcome criteria chosen, there had to be evidence in the notes, and it must have been measured within the last 13 months.

### Process criteria

Process criteria were measured only for patients exclusively under the care of the general practitioner (2566 patients). The question on eye examination was divided according to whether the visual acuity, the state of the retinas, or both, were recorded.

### Outcome criteria

The outcome criteria chosen were surrogate: measurements that

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Submitted: 18 August 1995; accepted: 16 January 1996.

© British Journal of General Practice, 1996, 46, 401-405.

indicated a likelihood of developing complications. These measures were collected for all patients, including those under hospital follow up (3974 patients).

Control of glycaemia, as measured by the glycosylated haemoglobin (HbA1c) levels, was categorized according to the following classification (Pook laboratory standards shown in brackets):<sup>4</sup>

- level below the mean for the normal population plus two standard deviations represents 'good' control (<6.5%);
- level greater than or equal to the mean plus two standard deviations, but less than the mean plus four standard deviations represents 'acceptable' control (6.5–7.7%); and
- a level equal to or greater than the mean plus four standard deviations was classed as 'poor' control (>7.7%).

Fructosamine results were ignored in this analysis, as it had been measured in only 199 patients (6.6% of total measurements).

Type of diabetes was divided into four categories:

- non-insulin-dependent diabetes (NIDDM), controlled by diet alone (NIDD);
- NIDDM controlled by oral hypoglycaemics and diet (NIDD/T);
- insulin-dependent diabetes (IDDM), controlled by insulin therapy since diagnosis; and
- NIDDM controlled with insulin and diet (NIDD/I); these patients are not insulin dependent, and are not prone to ketoacidosis. They were categorized as having undergone at least one month of treatment without insulin.

**Analysis of data**

Data obtained from each practice visit were analysed by simple percentages and mean HbA1c after each visit and the information sent to the participating practice. After all practice visits had been completed, the data from all 37 practices, including 3974 diabetic patients, were analysed. A copy of this analysis was sent to all participating practices.

**Results**

*Prevalence of diabetes*

Prevalence data were available for 36 practices; 4130 known diabetic patients from a total list size of 256 130. Therefore, the overall prevalence of known diabetes was 1.6%, ranging in individual practices from 0.8 to 2.6%. The practice with the highest prevalence had a disproportionately high elderly population (14.1% of the list being aged over 75, compared with the national average of 6%). The population structure of Poole differs from the UK as a whole: 25.6% of the population is aged over 60, whereas the figure for the UK is 21.2% (1991 Census figures).

*Sex of diabetic patients*

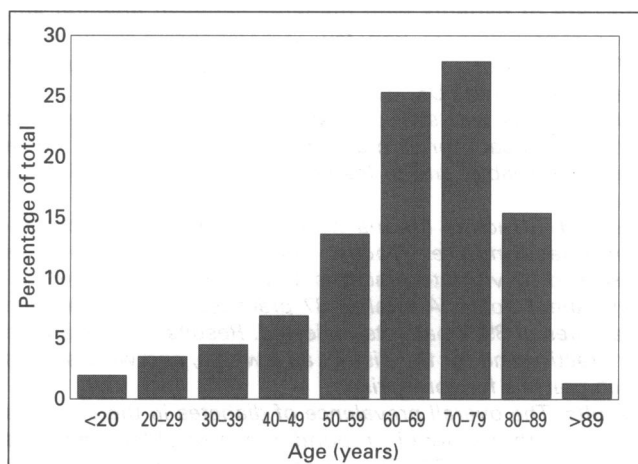
In this survey, diabetes was strikingly more common in men of all age groups, except the very elderly. The overall male to female ratio was 1.2:1 and was at a maximum of 1.5:1 in the age group 21–40 years. This overall sex ratio is significantly different from the general population ( $P < 0.001$ ).

*Age of diabetic patients*

The overall age distribution of diabetes in the survey is shown in Figure 1. The preponderance of elderly patients is evident, and considerably more patients are aged over 80 (14.2%) than are under 40 (10.6%).

*Type of diabetes*

The four types of diabetes were distributed through the population thus: NIDD, 920 patients (23.2%); NIDD/T, 1810 (45.6%); IDDM, 847 (21.4%); NIDD/I, 359 patients (9.0%); and treatment unknown, 38 patients (0.96%).



**Figure 1.** Age range of 3974 patients with known diabetes.

**Table 1.** Structure questionnaire: replies of 45 general practices.

Structure criterion	Percentage of respondents possessing criterion
Age/sex register	100
Diabetic register	84
Register patients under hospital follow-up	49
Register patients under GP follow-up	36
Appointment system	91
Recall system for follow-up	71
Nurse visit for non-attenders	4
Audit facilities:	
structure protocol	18
process protocol	11
outcome protocol	4
Urinalysis facilities	100
Venepuncture facilities	91
Height measurement facilities	98
Weight measurement facilities	100
Separate nurses room	91
Snellen chart for visual acuity	91
Use of optometrist for eye examination	51
Use of primary care chiropody service	42
Ophthalmoscope in practice	100
Sphygmomanometer in practice	100
Practice nurse with specific diabetic training	58
GP with post-graduate diabetic training	60
One partner sees all diabetics for follow-up	38
All partners see own diabetics for follow-up	60
Protected time in ordinary surgery for follow-up	42
Diabetic mini-clinic	84
Facilities in practice for education	64

*Analysis of structure questionnaire*

The replies to the questionnaire are summarized in Table 1.

*Follow-up of patients*

Out of a total of 3974 diabetic patients involved in the survey, 2566 (65%) had been returned to the sole care of their general practitioner. However, the actual proportion of patients under sole care of the general practitioner varied from practice to practice (32–86%). The majority (92%) of these patients had NIDDM, most patients suffering from IDDM being cared for by hospital clinic.

*Care analysis: process criteria*

The process criteria assessed are summarized in Table 2.

*Care analysis: outcome criteria*

The results for the group as a whole are shown in Table 3.

**Table 2.** Process criteria for patients under sole care of a general practitioner ( $n = 2566$ ).

Process criterion	Percentage in whom investigation carried out
Weight	69
Blood glucose	82
Hba1/fructosamine	76
Creatinine	46
Cholesterol	25
Urinalysis	65
Foot:	
inspection	29
record of pulses	28
Blood pressure	82
Eyes:	
visual acuity record only	4
state of retinas record only	3
visual acuity and state of retinas record	44
Record of smoking habit	52
Hospital communication	92
Patient seen for follow-up	84

**Table 3.** Prevalence of outcome criteria (%); number of patients tested shown in brackets.

Criterion	Total	Age of patient					Type of diabetes			
		<20	21–40	41–60	61–80	>80	IDDM	NIDD/I	NIDD	NIDD/T
Chronic renal failure (serum creatinine >150 $\mu\text{mol l}^{-1}$ )	6 (1967)	0 (16)	2 (150)	1 (600)	7 (1085)	11 (236)	5 (24)	10 (210)	4 (400)	5 (1000)
Proteinuria (urine protein >0.3 g $\text{l}^{-1}$ )	7 (3075)	4 (77)	6 (233)	7 (614)	7 (114)	6 (350)	6 (38)	8 (288)	5 (580)	8 (1313)
Hypertension (blood pressure >160/90)	27 (3175)	6 (18)	8 (181)	22 (598)	31 (1589)	32 (369)	17 (452)	30 (267)	28 (654)	30 (1380)
Retinopathy present (all grades)	17 (2197)	0 (46)	19.5 (215)	23 (491)	16 (1210)	13 (235)	28 (594)	28 (254)	4 (380)	13.5 (956)
Hypercholesterolaemia (serum cholesterol >6.5 $\mu\text{mol l}^{-1}$ ) <sup>a</sup>	33 (206)									

<sup>a</sup>Measured for general practitioner follow-up patients only.

Information on Hba1c was available for only 2804 patients, and is summarized in Table 4 and Figure 2.

**Discussion**

Poole has been described as a 'typical English community',<sup>16</sup> and although its population is slightly more aged than the national average, the results of this survey should be applicable to any district in which most diabetic patients are cared for by general practitioners.

This method of survey relies on the cooperation of general practitioners and their staff, who are open to external examination of their practice. It does possess weaknesses, however; in particular, it was difficult to confirm details of the answers to the structure questionnaire and to check the accuracy of the diabetic register, which means that some patients may not have been included. It was also not possible to check the validity of the diagnosis of patients on the register. Retrieval of data can be complex, especially if the practice uses mixed computer and paper records, and must be carried out by someone with experience of general practice records.

The structure of diabetic care by general practitioners showed that practices are well organized in many aspects: 84% of the practices surveyed have a diabetic register, and virtually all practices have the 'hardware' to perform diabetic checks (e.g. 91% have Snellen charts). Some sort of recall system for follow-up, which is considered essential for proper care,<sup>2</sup> was maintained by 71% of practices. There does seem to be some confusion about the use of optometrists for eye examinations (only 51% of practices possessing this facility), despite the presence of such a system throughout the district. The situation regarding primary care chiropody is complex for, although there is a network of chiropodist services in the Poole area, the waiting lists can be long and some doctors were unaware of its existence.

The low proportion of practices in this survey with any evidence of audit being carried out will probably change as the diabetes chronic disease management (CDM) programme,<sup>17</sup> introduced in 1992, comes into effect, making audit compulsory: 106 out of 108 practices in Dorset are currently registered for this. It is interesting to note that most practices (60%) elected for all practitioners to see patients with diabetes, rather than have a 'specialist' who sees them all, especially as it has been suggested that doctors with an interest in diabetes can achieve better gly-

**Table 4.** Mean percentage of blood Hba1c.

	Average % Hba1c
All patients (n = 2804)	8.07
Good control (<6.5%)	17.9
Acceptable control (6.5–7.7%)	27.8
Poor control (>7.7%)	54.4
Age groups (years):	
<20 (n = 51)	9.72
21–40 (n = 216)	8.62
41–60 (n = 599)	8.38
61–80 (n = 1576)	7.84
>80 (n = 362)	8.00
Diabetes type:	
IDDM (n = 597)	8.00
NIDDM (n = 578)	6.97
NIDDM/T (n = 1358)	8.04
NIDDM/I (n = 268)	9.01

caemic control.<sup>18</sup> In this survey, more practices ran diabetic mini-clinics than used protected time in normal surgery. References in the literature are divided on the merits of each system.<sup>18–20</sup>

Despite the fact that 84% of patients in this survey underwent some sort of diabetic follow-up consultation in the last 13 months (Table 2), the process criteria analysis showed rather mixed results. For example, about half of the patients had a record of smoking habit, and in these, 16.8% were smokers. This compares with 21% in a survey in Poole in 1984–1985.<sup>13</sup>

Only 44% of the diabetics surveyed had apparently undergone full eye examination. However, this may reflect logistic problems in transferring information from the optometrist to the general practitioner, and does not necessarily mean that a majority of patients are missing the proper examination. Nonetheless, the proportion of patients with known retinopathy, of all grades of severity (17.3%), is considerably lower than the 30% that might be anticipated.<sup>21</sup> Since this survey was undertaken, moves have been made to tighten up the system of eye examination in the district by streamlining communications and rewarding optometrists financially for examinations.<sup>22</sup>

Inspection of the feet of patients with diabetes is vital in detecting ulcers characteristic of diabetic foot disease, which can necessitate amputation if not treated. Foot disease is strongly correlated with age; in one series, 90% of foot ulcers occurred in patients over the age of 60 years.<sup>14</sup> If the assumption is made that an adequate inspection of the feet has been made in those patients with a record of foot pulses, as well as in those with a record of 'foot inspection', then the level of adequate foot care in the elderly age group (over 60 years) is 56% of the total.

Glycaemic control was 'acceptable' in only one group of patients: those controlled on diet alone (NIDDM) (see Table 4). This is not surprising, as these patients would have been on additional treatment if their condition had been difficult to control. Patients being treated with insulin tend to be the most difficult to control, especially adolescents and those whose disease is classified as NIDDM/I. This last group showed the worst set of outcome criteria (Table 3). Patients on tablet treatment (NIDDM/T) do not fare too badly (mean Hba1c 8.04%), and generally, the elderly (60 years and above) are not much above the 'acceptable' range. Any targets set for glycaemic control of diabetics should take into account the likelihood of achieving them:<sup>23</sup> this will vary with age and treatment. It should be possible to tighten up con-

trol to below 7.7% in the elderly and tablet-treated groups without inconveniencing the patient too much, but it may not be possible (or even desirable) to reduce such patients to 'good' levels (below 6.5%). Patients of under 40, and/or those who are on insulin treatment, will be more difficult to bring under control, but these patients have recently been shown to be the ones to benefit from better control, in terms of reducing the incidence and progression of microvascular complications.<sup>24</sup>

The high prevalence of hypercholesterolaemia (Table 3) is not necessarily representative of the diabetic population as a whole, because in only 25% of patients surveyed had the measurement been made in the last year. In addition, these results are based on the last reading in the notes, and it would be unrealistic to label patients as meriting treatment on the basis of only one reading. Nevertheless, the presence of 33% of diabetics with cholesterol levels above 6.5 mmol l<sup>-1</sup> is cause for concern, as cholesterol levels undoubtedly contribute to ischaemic heart disease. This concern also applies to the situation of hypertension. The choice of a blood pressure of 160/90 as a cut-off point is generous, as patients below the age of 60 years will probably require therapy at lower levels, especially if they have other risk factors or complications such as retinopathy. It is worrying to note that patients on anti-hypertensive treatment (1047; 26% of the total), had a high prevalence of hypertension (45%), despite treatment.

The results of this survey show that generally a high level of activity is devoted to the care of diabetics in this community, and compare favourably with other published studies.<sup>19,20</sup> However, accurate comparisons are difficult to make, particularly because of lack of standardization of the classification and measurement of outcome criteria.

Further improvement in diabetic care depends as much on logistic factors as on anything else: for example, establishing an efficient call/recall system, keeping an accurate register of those patients discharged from the hospital diabetic clinic. Reduction in macrovascular risk factors, which should be a priority, will require vigilance by general practitioners, but may well also require more resources. For example, diagnostic tests for lipoproteins are relatively expensive, but are necessary for correct assessment of hyperlipidaemia; the drug treatment for this condition can also be costly.

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