

Organization of care for diabetic patients in general practice: influence on hospital admissions

ANDREW FARMER

ANGELA COULTER

SUMMARY. *The aim of this study was to determine whether there is a relationship between the structure of care for diabetes in general practice and the corresponding admission rates for diabetic patients to hospital. A questionnaire was sent to 350 group or single handed practices in the Oxford region and a retrospective analysis was made of admission rates using hospital activity analysis. Admission rates were adjusted for the age structure of the practices. The degree of organization of care was determined by drawing up a composite score from the answers to the questionnaire and comparing practices with few, average and many facilities. There was a significant trend in the rates of admission across the groups of practices: those with few facilities made 16.2 admissions per 10 000 population over two years, those with average facilities 13.8 admissions, and those with many facilities 14.0 admissions (chi-squared trend = 6.88, 1 df, P<0.01). These findings support the hypothesis that organized general practice care reduces the rate of hospital admissions, although there are many other influences on the admission rate from any one practice.*

Introduction

GENERAL practitioners are frequently encouraged to take more responsibility for the care of their patients with chronic diseases.¹ Some studies have suggested that the care of diabetic patients in a routine general practice setting leads to poor blood glucose control, increased hospital admissions and increased mortality.² Other studies have shown that organized diabetic care in general practice can provide a high standard of care³ and good control of blood glucose.⁴

Referral rates have been proposed as a means of identifying doctors who under-use and over-use to the hospital services.^{5,6} The government has proposed that larger group practices may wish to manage their own budgets in order to improve their own facilities and have more control over the use of hospital services.⁷ The impact of these proposals is as yet unknown.

The aim of this study was to determine whether practices providing organized care for diabetic patients had lower admission rates to hospital than practices without these facilities. It was also hoped to demonstrate an application of routinely collected hospital activity analysis data to general practice.

Method

Questionnaire

Information about the care offered to diabetic patients by general practitioners in the Oxford region was collected using a postal

A Farmer, MRCP, general practitioner, Thame, Oxfordshire and A Coulter, MSc, primary care research officer, Unit of Clinical Epidemiology, University of Oxford.

Submitted: 20 April 1989; accepted: 28 August 1989.

© *British Journal of General Practice*, 1990, 40, 56-58.

questionnaire. This asked about the facilities available in the practice for diabetic care, the training and interests of staff, current list size and changes over the past four years, and whether the practice routinely referred any of their diabetic patients to hospitals outside the Oxford region. Specific questions were asked about whether the practice had a system of organized care for diabetics, whether there was a specific policy for diabetic care, whether there was a doctor with a special interest in diabetic care, whether there was a separate doctor or nurse run clinic for diabetics, whether there was a nurse available with special training and whether a practice nurse was employed. The practices were asked whether they had a dietician or chiropodist readily available to patients, whether there was a system for identifying and recalling diabetics if they defaulted from care and whether a structured record card was used to record details of diabetic patients. They were asked if there were facilities for blood glucose analysis available within the practice. The final group of questions asked about facilities for eye screening: Snellen charts for testing visual acuity, dilating drops for examining fundi and whether an ophthalmoscope was available.

In June 1987 an initial pilot questionnaire was sent to practices known to have a computerized age-sex register to enable hospital admission rates to be fully adjusted for the age-sex distribution of the practices. Six months after the pilot study a revised questionnaire was sent to all practices registered with the four family practitioner committees in the region. Practices were asked to give an age breakdown of their practice in the bands 0-64, 65-74 and 75 years and above. The pilot study practices were asked to complete part of the questionnaire again to enable their inclusion in the final analysis. One reminder was sent to each practice if there was no response to the initial mailing.

The Oxford region hospital activity analysis provided figures for admissions of patients from each practice to hospitals in the Oxford region. Each separate admission by each patient with diabetes (*International classification of diseases* (9th revision) code 250) as the principal diagnosis was counted as a separate episode during 1985-86.

Some information about list size and numbers of doctors in each practice was available from a number of other recent questionnaires and this was used to compare those practices who did not reply with those who responded.

Analysis

Analysis was carried out using SPSS/PC+. Admission rates were adjusted for the age distribution of the practice if sufficient information was given. The age distribution of all those practices who responded was used as a standard to which admission rates were adjusted by the direct method. To measure the level of organization of diabetic care in the practices a simple score was calculated by adding together each of the 16 facilities that were available to the practice. Practices were ranked according to the number of facilities and divided into three groups of as near the same size as possible by the scores at the 33rd and 66th centiles.

The differences between those who responded with full information and those with partial information was analysed using the t-test. The groups with different facilities available had their

total numbers of patients and admissions pooled to test for significance using the chi-squared test for trend.

Results

The four family practitioner committees had 364 practices on their lists. Of these 14 were found to be duplicates (for example branch surgeries). This left a group of 350 practices for analysis: 246 questionnaires were returned as part of the main survey and 32 of the original 43 practices in the pilot study returned the modified questionnaire, giving an overall response rate of 79%. One of these practices was outside the Oxford region. One hundred and ninety two practices were able to give full details of their facilities and the age distribution of their practice population, but most of the rest failed to provide details of their age distribution. Apart from this problem the questionnaire was well completed, with only five practices omitting to tick boxes on the main part of the questionnaire.

There was no significant difference between list sizes, numbers of doctors, numbers of facilities or admission rate for diabetes of those practices that responded and those that gave an incomplete or no response (Table 1). Of respondents providing full information 42% said they had an organized system of care while

39% of respondents providing partial information said they had organized care. However, this difference was not significant. There was a slight but non-significant difference in the response rates between practices in the four family practitioner committee areas. There appeared to be no major differences between those practices that responded fully and those that did not.

The frequency with which different facilities for diabetic care were available to patients and doctors varied widely. Table 2 compares the facilities of all practices responding with those who provided full information about list size. The admission rates for those practices with and without the facilities are shown. In each case those without a facility had a higher mean admission rate than those practices which had the facility.

Comparisons between practices with different numbers of facilities are shown in Table 3. These results show that practices with more facilities for diabetic care were slightly larger than those with fewer facilities and had more doctors. The pooled admission rates, adjusted for age, for each of the groups showed a significant trend with better resourced practices having lower admission rates to hospital for diabetic patients.

Changes in list size and referral outside the region may affect the admission rate. However, the mean admission rate of the 93 practices with no change in their list sizes (12.1) and of the 99 with some change (12.3) were the same and so did not bias the figures. Although the mean admission rate for the nine practices referring outside the region (10.0) was lower than for the remaining 183 practices (12.3) their mean number of facilities was also slightly lower (8.8 versus 6.7). The effect of referring outside the region should be to artificially lower the admission rate and so this was unlikely to have caused the finding that practices with lower scores have higher admission rates. Practices with high admission rates did not appear to have given an inaccurate or low list size as judged by numbers of doctors and other estimates of list size that are available.

Discussion

The results of this study showed a small but significant reduction in admission rate to hospitals for patients attending practices that had more facilities for diabetic care available. There were a number of difficulties in interpreting this study. The

Table 1. Characteristics of practices responding with complete and incomplete information.

	Mean values for practices providing:		Number of practices responding with:	
	Full information	Partial or no information	Full information	Partial or no information
List size (questionnaire)	7856	7100	192	57
List size (second sources)	7982	6933	183	133
Number of facilities	8.7	7.8	192	82
Number of doctors	3.7	3.8	192	157
Admission rate unadjusted for age ^a	11.9	10.9	192	40

^a Number of admissions for diabetes per 10 000 patients over two years.

Table 2. Facilities available to practices and influence on admission rates for diabetes.

Facility	% of practices with facility		Mean admission rates for practices providing complete data ^a		
	All practices (n = 289) ^b	Practices providing complete data (n = 192)	Practices without facility	Practices with facility	Difference ^c
Ophthalmoscope	100 ^d	99	22.8	12.1	10.6
Snellen chart	98 ^d	97	19.8	12.0	7.8
Practice nurse	84 ^e	87	15.6	11.8	3.8
Blood glucose analysis	71	74	13.2	11.8	1.4
Register of diabetics	66	69	12.6	12.0	0.7
Dilating drops	63 ^d	65	13.1	11.7	1.4
Chiropodist	51	52	12.8	11.6	1.2
Dietician	49	50	13.3	11.1	2.2
Practice policy on diabetes	44	48	12.8	11.6	1.2
Recall system for diabetics	44	46	12.9	11.5	1.4
Record card for diabetics	40	44	12.5	11.8	0.7
Organized care for diabetics	39 ^d	42	13.0	11.1	1.9
GP run diabetic clinic	25	29	13.1	10.1	3.1
Specially trained nurse	23	24	12.4	11.6	0.8
GP with interest in diabetes	21	22	12.7	10.4	2.4
Nurse run diabetic clinic	18	22	12.4	11.5	0.9

^a Geometric mean. Number of age adjusted admissions for diabetes per 10 000 population over two years. ^b Includes all practices replying in the pilot and the main study. ^c Calculated from admission rates to four decimal places. ^d n = 282. ^e n = 288.

Table 3. Characteristics of practices with different numbers of facilities among the 192 practices providing complete information.

Number of facilities	Pooled admission rates (unadjusted for age)	Pooled admission rates ^a (adjusted for age)	Mean number of doctors	Mean list size
0-6 (n=64)	15.9	16.2	2.9	6530
7-11 (n=74)	14.0	13.8	3.6	7609
12-16 (n=54)	13.9	14.0 ^b	4.9	9768

n = total number of practices. ^a χ^2 trend = 6.88, 1df, P<0.01.

finding that practices with increased facilities had lower admission rates provides some support for the hypothesis that organized general practice care reduces the rate of hospital admissions. However, there are many other factors which are known to influence admission rates. These include bed availability in the different hospitals, differing admission policies of different physicians and variations in patient expectation and demand.⁸

In addition, hospitals may differ in the policies adopted for recording the main reason for admission. Diabetics may also be admitted for a number of different reasons and there will be further differences between the problems of type I and type II diabetics. It has not been possible to control for all these factors in this study. The other major difficulty is in relating facilities available to the use that is made of them by doctors. It would be wrong to assume that all general practitioners in a practice necessarily make use of all the facilities available to them, and that care is provided to all their diabetic patients.

Several studies have attempted to look at the characteristics of general practitioners that may be related to referral behaviour. Hospital activity analysis allows the collection of admission figures from large numbers of practices and it was our intention to look at the characteristics of practices rather than individual doctors and their relationship to admission rates. Both Roland⁵ and Marinker⁹ have called for referral rates to be based on practice list size rather than the individual lists of doctors. This study has been able to make use of admission rates adjusted for the age structure of practices. We depended on our respondents to supply age breakdowns of their practice populations and only 69% were able to do so. However a computerized family practitioner committee should be able to supply much of the information required.

This study highlights one of the major difficulties in drawing conclusions from data comparing practices. Despite collecting numbers of admissions for a period of two years the numbers from each practice were low. Such figures would be unsuitable for using as performance indicators for individual practices since true variations resulting from the effects of improved care may be swamped by random variations.¹⁰

Practices in the study varied widely in the facilities available for diabetic care. Although most had practice nurses and the basic equipment for retinopathy screening, less than half had an organized system of care such as drawing up practice management policies, using structured record cards, identifying diabetics and arranging for their recall for check ups.

This study has demonstrated an association between organized diabetic care and lower admission rates for diabetic patients, but we cannot necessarily assume a causative relationship. The questionnaire enquired about current organization and made no attempt to establish the structure of care during the period of the admissions. A practice with more facilities available may point to a group of doctors who are more organized and ready to take more responsibility for continuing care of patients with chronic diseases. There seemed to be a slightly lower admission rate from practices which had the services of a dietician and

chiroprapist readily available. The availability of these services is more likely to be influenced by the policies of districts rather than individual practices and may therefore point to the importance of the facilities themselves in influencing admission rates.

Encouraging the provision of facilities by offering financial incentives may not lead to a reduction in admission rates either because rates are already low or because other factors are more important in determining the rate.

This study highlights the need for more rigorous evaluation of the value of organized care for diabetics in general practice, and for studies of the effects of promoting improvement in the facilities available in primary care. Evaluation of this type of programme needs to be carried out using hard outcome measures such as blood glucose control, since referral rates and admission rates are influenced by many factors other than the quality of care offered.

References

1. Hasler J, Schofield T (eds). *Continuing care: the management of chronic diseases*. Oxford University Press, 1984.
2. Hayes TM, Harries J. Randomised clinical trial of routine hospital clinic care versus routine general practice care for type II diabetics. *Br Med J* 1984; **289**: 728-730.
3. Dornan C, Fowler G, Markus AC, Thorogood M. A community study of diabetes in Oxfordshire. *J R Coll Gen Pract* 1983; **33**: 151-155.
4. Singh BM, Holland MR, Thorn PA. Metabolic control of diabetes in general practice clinics: comparisons with a hospital clinic. *Br Med J* 1985; **289**: 726-728.
5. Roland M. General practice referral rates. *Br Med J* 1988; **297**: 437-438.
6. Armstrong D, Britten N, Grace J. Measuring general practitioner referrals: patient, workload and list size effects. *J R Coll Gen Pract* 1988; **38**: 494-497.
7. Department of Health. *Practice budgets for general medical practitioners. NHS review working paper 3*. London: HMSO, 1989.
8. Sanders D, Coulter A, McPherson K. *Variations in hospital admission rates: a review of the literature*. London: King Edward's Hospital Fund for London, 1989.
9. Marinker M, Wilkin D, Metcalfe DH. Referral to hospital: can we do better? *Br Med J* 1988; **297**: 461-464.
10. Moore AT, Roland MO. How much variation in referral rates among general practitioners is due to chance? *Br Med J* 1989; **298**: 500-502.

Acknowledgements

We would like to thank all those general practitioners who completed the questionnaires. We are grateful to Angela Daniels for administrative assistance and Valerie Seagrott for statistical advice. This study was supported by a grant from the Scientific Foundation Board of the Royal College of General Practitioners. The Unit of Clinical Epidemiology is part of the University of Oxford Department of Community Medicine and General Practice and is funded by the Department of Health and the Oxford Regional Health Authority.

Address for correspondence

Dr A Farmer, The Health Centre, East Street, Thame OX9 3JZ.



The Royal College of General Practitioners ACCOMMODATION AND CATERING

Members of the College are welcome to stay at 14 and 15 Princes Gate; early booking is recommended. Bed and breakfast may be obtained. Bookings should be sent to Lindsey Demetriou, the Accommodation Secretary. Public rooms may be hired subject to availability. Please contact Elizabeth Monk, Secretary to the Establishments Officer, at the Royal College of General Practitioners, 14 Princes Gate, Hyde Park, London SW7 1PU. Telephone 01-581 3232.