

An audit of the care of diabetics in a group practice

B. J. DONEY, M.R.C.G.P.

General Practitioner, Winchester, Hampshire

SUMMARY. The diabetics in a general practice of 20,175 patients were identified during one year and 119 were found—a prevalence of 5.9 per thousand.

The age and sex distribution, method of treatment, criteria of diabetic control, complications, and present method of care were analysed from the medical records to examine the process of medical care of a chronic disease in general practice.

Introduction

The responsibility of the physician to audit the medical care he provides has recently been increasingly discussed (*Journal of the Royal College of General Practitioners*, 1974; *British Medical Journal*, 1974; Curtis, 1974).

The examination of the process of medical care of a chronic disease, and of the records involved in such care, seems appropriate for study in general practice.

Such a study of the care of diabetics was planned to determine the present status of the long-term care of one chronic disease in one group practice. Diabetes was chosen because it was thought to be more readily defined than many of the chronic diseases and, as treatment is mainly confined to a small group of drugs prescribed regularly, the identification of patients is easier. In the long-term management of the diabetic, lasting for the patient's life-time, the general practitioner's records are of crucial importance.

Previous studies

Previous studies of diabetes in general practice have included those by Andrews, studying 48 practices in West Cornwall (Andrews, 1957); Logan, studying eight practices during one year (Logan, 1953); the Hull and East Riding sub-faculty of the College of General Practitioners of 14 practices over three months (College of General Practitioners, 1960); Letty, of a Yorkshire practice over a month (Letty, 1961); and two from studies from individual practices: Stewart-Hess from Devon (Stewart-Hess, 1973) and Wilks in Bristol (Wilks, 1973). These studies have concentrated on the pattern of the disease and its therapeutic management, but have said little about the prevalence of diabetic complications, the assessment of medical care, or the standard of recording.

Aims

The aims of this study were to identify known cases of diabetes mellitus, and to review from the patient's medical record the pattern of the disease diabetes, its complications, and some parameters of the medical care.

Method

The practice

Our group practice is a partnership of eight doctors responsible for mainly National Health Service patients living in the city of Winchester and surrounding rural area up to

five miles from the central surgery. The practice population was 20,175 at the mid-point of the year of the study. The two consultant physicians at the Winchester district hospital both care for diabetic patients, but there is no diabetic clinic.

Definition of diabetes

The definition of diabetes mellitus is essentially based on abnormal levels of blood glucose. However, the result of a glucose tolerance test or significant blood glucose estimation at the time of diagnosis was frequently missing from the records of the patients, especially those diagnosed many years ago or in other practices and hospitals. This has led to the requirement of a practical definition based on criteria applicable to the medical record of the presumed diabetic patient.

Diabetes is here defined when one or more of the following criteria could be confirmed from the medical record:

- (1) Raised random blood sugar above 200 mg/100 ml (Mahler and Hayes, 1973).
- (2) Fasting blood sugar level above 125 mg/100 ml—where the fasting state is specified in the record (Fitzgerald and Keen, 1964).
- (3) Abnormal glucose tolerance test:
 - (a) Blood glucose level of 180 mg/100 ml or over at some time during the test or 110 mg/100 ml after two hours (Fitzgerald and Keen, 1964).
 - (b) Results stated to indicate diabetes in a consultant report or letter.
- (4) Clinical diagnosis: when glycosuria was present with one or more of the following symptoms: polyuria, polydipsia, polyphagia, loss of weight, *and* when the symptoms and the glycosuria were effectively removed by carbohydrate restriction, or hypoglycaemic drugs, or insulin.
- (5) Patient receiving daily insulin therapy.
- (6) Patient with one or more of the following complications confirmed by specialist opinion: diabetic retinopathy, diabetic ketosis, diabetic neuropathy, diabetic renal disease, cataract under the age of 40.

The names of 124 patients were collected during the year; five did not satisfy these criteria.

Practice organisation

Each partner was asked to note the names of diabetics he could remember and all diabetics presenting for any medical advice or for the renewal of relevant drugs by prescription. The practice receptionists were asked to record the names of any diabetics that came to their knowledge, including those requesting repeat prescriptions for drugs used in the treatment of diabetes. Further names were identified from a list of patients collected by each partner for influenza prophylaxis, and from the diagnostic registers ('E' books) kept by two partners. The district hospital does not keep a morbidity register. The contents of the medical record envelopes, including all hospital and pathological reports, of all the patients identified were examined in the light of the definitions used for the study. Relevant information was abstracted on to a coded form and transferred to punch cards for analysis. Confidentiality was preserved by each patient receiving an identification number used on all analyses, the key being held by me.

Results

(1) The pattern of the disease

In the practice population of 20,175, 119 known diabetics were identified, a prevalence of 5.9 per thousand. There were 58 female and 61 male patients. The age of the patients at the time of diagnosis and their present age are shown in table 1.

TABLE 1
AGE OF DIABETIC PATIENTS AT DIAGNOSIS AND TIME OF STUDY

Age	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89
Number At diagnosis	3	7	6	14	13	22	30	20	7
At time of study	0	5	6	3	13	13	33	33	13

Figure 1 shows the duration of the known presence of diabetes. Twenty-eight patients (23 per cent) had been diagnosed within the past year and 18 (15 per cent) had a history of more than 15 years.

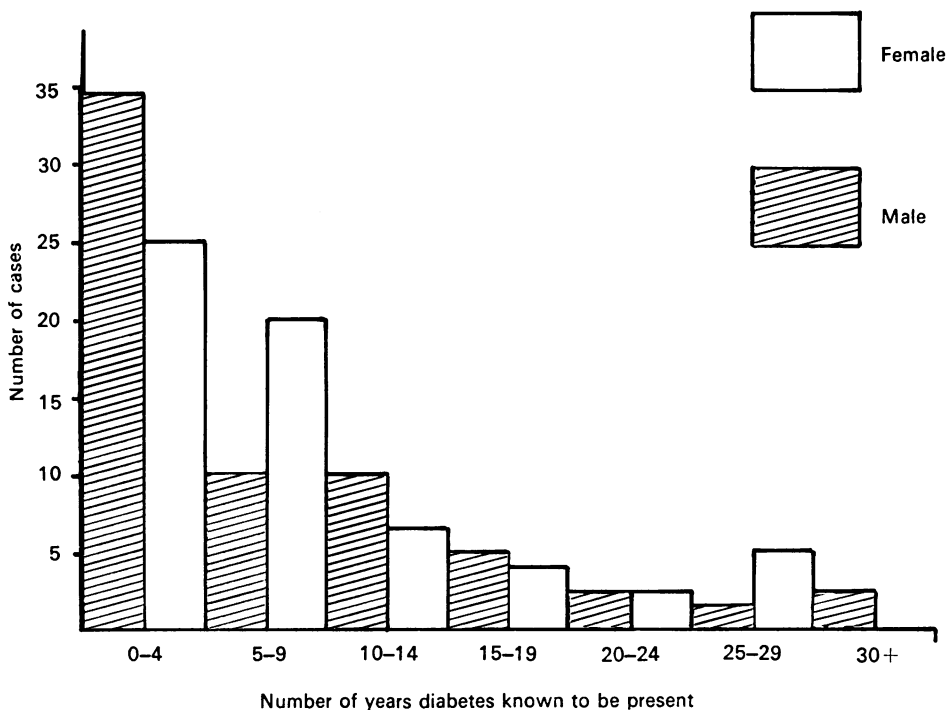


Figure 1
The duration of the known presence of diabetes

In the year previous to diagnosis classical symptoms of diabetes, especially loss of weight, were recorded in the notes in 20 cases (16 per cent). Until the date of diagnosis no urine testing was recorded in these cases. 'At-risk' factors, especially the birth weights of previous infants, were not prominently recorded in the notes of these diabetic patients. Only two women were recorded as having had a baby weighing over 4.5 kg (ten lbs).

The present treatment was hypoglycaemic drugs in 64 (54 per cent), insulin in 41 (34 per cent), and diet alone in 14 (12 per cent).

(2) Recording of the criteria of diabetic control

In the notes examined the recording of the criteria of diabetic control was poor. There were no recordings of body weight in 86 per cent of the notes, and even when weight was recorded the height invariably was not, so that no conclusion could be drawn on the patients' degree of conformity to an ideal. Random blood sugars were not recorded at

all in 27 per cent of the notes, not recorded within the last year in 37 per cent and not within the last five years in 16 per cent. Recordings of sugar in the urine (or mention of the patient's own testing) were present in 119 cases (100 per cent), but in 76 patients (63 per cent) this was not within the last year.

(3) *Complications*

Of the 119 known diabetic patients 41 (34 per cent) have, or have had, one or more of the complications shown in table 2.

TABLE 2
DIABETIC COMPLICATIONS RECORDED

<i>Complication</i>	<i>Case incidence</i>			<i>Per cent of study patients</i>
	<i>At presentation</i>	<i>Since diagnosis</i>	<i>Total</i>	
Retinopathy	2	14	16	13
Vascular disease	3	9	12	10
Episodes of ketosis	3	4	7	6
Neuropathy	1	4	5	4
Cataracts under 40		2	2	2
Renal disease		2	2	2

In those 18 patients (15 per cent of total diabetics) with a known diabetic history extending over a period greater than 15 years (median age 61 years), ten patients (55 per cent) had a diabetic complication recorded and eight patients (44 per cent) had no recorded complication.

Three patients presented with ketosis, there were four episodes later, and one patient died in ketosis. There was no mention of any test for ketonuria in the last infective, pyrexial, or vomiting illness in 112 sets of notes.

Sixteen patients (13 per cent) have retinopathy. In two patients this condition was recorded at the presentation of the disease. In the 79 patients over the age of 60 there were 12 (15 per cent) with retinopathy. The prevalence of retinopathy compared with the duration of the known presence of diabetes is shown in table 3.

TABLE 3
DURATION OF KNOWN DIABETES COMPARED WITH THE PREVALENCE OF RETINOPATHY

	<i>Duration of known presence of diabetes in years (119 patients)</i>						
	<i>0-4</i>	<i>5-9</i>	<i>10-14</i>	<i>15-19</i>	<i>20-24</i>	<i>25-29</i>	<i>30+</i>
Total patients in each group	58	28	15	7	4	5	2
Per cent with retinopathy	3.4	21.3	20	28.5	25	20	50

Two of the 17 patients with cataract developed their eye condition under the age of 40. Five patients (four per cent) had neuropathy confirmed by a consultant physician. No mention was made in any of the notes of the 61 male patients about the presence or absence of impotence. Two patients had confirmed diabetic renal disease. The recording of any test for albuminuria was absent in 84 per cent of the notes.

Ten patients (eight per cent) had vascular disease: seven coronary artery disease, one peripheral vascular disease, and two had both. Males and females were equally represented.

(4) *Medical care of diabetics*

Sixty-three patients (52 per cent) were attending neither their general practitioner nor the consulting physician's clinic regularly for medical supervision of their diabetic condition, 29 patients (24 per cent) attended only the consultant clinic, 26 (21 per cent) attended only the general practitioner, and only four patients (three per cent) received dual care.

The general practitioner had attended 101 (84 per cent) of the 119 diabetics for some reason or another during the past year and in 69 cases (58 per cent) the frequency of consultation had been three monthly or less. Nevertheless, only 28 patients (21 per cent) were receiving regular recorded checks of their diabetic state.

In the current medical care of the 38 patients with persisting complications, 14 (37 per cent) were receiving regular assessment, and 24 patients (63 per cent) were not. The average age of such patients receiving care was 70 and of those not receiving care 64. The pattern of medical care related to those patients with complications is shown in table 4. Twenty-one per cent of patients with complications and 22 per cent of patients without complications were being followed up by their general practitioner.

TABLE 4
PATTERN OF SURVEILLANCE RELATED TO COMPLICATIONS

		<i>38 patients with complications</i>	<i>81 patients without complications</i>
Patients regularly attending general practice	<i>Yes</i>	8	18
	<i>No</i>	30	63
Patients regularly attending hospital	<i>Yes</i>	6	23
	<i>No</i>	32	58
Dual care		0	4
No regular surveillance		18	44

Discussion

(1) *The study of medical care*

The difficulties involved in the definition and assessment of the quality of medical care have been discussed by Donabedian (1966) and Forsyth and Logan (1962) who state: "Although a general theory of medical care is not available, it is possible in specific areas and situations to indicate certain concrete things which ought to be done in given circumstances and then to ascertain whether they are being done or not, i.e. to examine the 'process of care'. In this sense the measurement of quality is possible".

An attempt has been made in this study to apply empirical standards to the pattern of the disease and its complications, comparing the findings with other epidemiological studies, and normative standards of measurement to the quality of care. These latter are set by standard textbooks and publications, but are ambiguous in some instances where equally legitimate sources differ in their views. Dissatisfaction has been expressed about the application to general practice of standards and criteria elaborated by specialists who practise in academic settings.

(2) *Examination of records*

The basis of this study was an examination of the contents of the patients' general practice medical record envelope. Opinions about the assessment of the quality of medical care from such records have elicited various, mainly pessimistic reactions. Clute (1963) has recognised that the lack of adequate records is still compatible with the practice of a good, or even an excellent quality of care, but McWhinney (1972) has argued that we can no longer tolerate a situation in which the quality of care is hidden from view.

The most striking feature of the notes examined here was the almost complete absence of 'nil entries', or negative findings—e.g. urine tests for sugar, protein, or ketones in which these constituents were found to be absent.

(3) *The pattern of the disease in this practice*

The practice prevalence of 5.9 diabetics per thousand population is a larger figure than some previous studies from general practice. Logan (1953) gives a figure of 3.8/1,000 in a population of 27,000 studied over a one year period and a survey in Hull of a population of 52,777 studied during three months led to the figure 3.5/1,000 (College of General Practitioners, 1960). On the other hand screening surveys have given a prevalence of *known* diabetics of 6–7/1,000 (Walker and Kerridge, 1961; Sonksen, 1972; Oakley *et al.*, 1968; College of General Practitioners, 1962).

The crude prevalence rate for females is about one quarter greater than for males (Marble *et al.*, 1971). Here, with almost equal representation of the sexes, female diabetics are under-represented. The present age of these diabetics (table 1) agrees with previous findings of a rarity of diabetes in children (White and Graham, 1971; Beardmore and Reid, 1966), and diabetes becomes more common as age increases, though the figure here for the over 65 age group was only 51 per cent compared with 69 per cent in a previous study (College of General Practitioners, 1960).

Figures for the incidence of new diabetics diagnosed are few; that quoted in Joslin's text (Marble *et al.*, 1971) is ten per cent of the total prevalence. The figure for the population under study should thus be 11.9 a year. This accords well with the 58 patients diagnosed within the last five years.

Patients treated by diet alone (12 per cent in this study) are almost certainly under-represented. This obviously arises in part from the method of case identification which relied largely on requests for repeat prescriptions. Price's textbook (Bodley-Scott, 1966) gives a figure of 40 per cent of diabetics being treated by this method. There was little evidence from the records that the general practitioner attempted to change treatment from hypoglycaemic drugs to diet alone when he had started treatment with the former and this may account in part for the low number of patients on diet alone. One study showed that 31 per cent of patients previously treated with hypoglycaemic drugs remained under good control when the drugs were stopped (Tomkins and Bloom, 1972).

Non-insulin dependent cases are stated to outnumber the insulin dependent by four or five to one (Jarrett, 1970), but here the figure is only two to one suggesting that many of our non-insulin dependent diabetics have not been identified for the study.

Thus, although the prevalence of known diabetics in our practice is much as expected from previous studies, the under representation of female cases, cases over 65 years old, and non-insulin dependent cases suggest that our identification of diabetics has been deficient. This appears not to be due to poor case identification alone, for the two partners with morbidity registers had no higher prevalence rates than the remaining partners.

(4) *Complications of diabetes*

The relationship between diabetic control and the development of diabetic complications is important. The balance of modern opinion would seem to support the view that good

diabetic control is important, if not just to avoid the initiation of complications, at least to moderate them. In the notes examined here the recording of the criteria of diabetic control was poor.

The incidence of clinical ketosis was low (seven episodes) despite the rarely recorded testing for ketonuria. Oakley reports the incidence of ketosis as one per cent a year (Oakley *et al.*, 1968).

Retinopathy as a presenting feature, in patients over 60, at all lengths of history, and its prevalence by age at diagnosis all show lower figures than Oakley's findings in a diabetic clinic (Oakley *et al.*, 1968).

Under the age of 40 cataracts are rare in the general population and their occurrence in diabetics is presumably due to the diabetes (Caird *et al.*, 1969). Only two such diabetics were recorded here.

When only significant symptoms and signs are included the frequency of neuropathy is about 13 per cent (Fry *et al.*, 1962). The prevalence here of only four per cent seems low, but there was little evidence in the notes of questioning for symptoms or of examination for signs of neuropathy.

The complete absence of note records about the presence or absence of impotence suggests that this is not sought at all. The reported frequency of impotence varies greatly depending upon how carefully it is sought. One study reported a prevalence of 25 per cent between the age of 30 and 34, and 54 per cent at 50 years (Rubin and Babbott, 1958), and another states that 50 per cent of patients who have had diabetes for over five years are impotent (Mahler and Hayes, 1973).

Diabetic nephropathy is found with increasing frequency as the duration of diabetes increases, but the prevalence is reported with a wide range (Fajans and Sussman, 1971). Here there were only two cases—with a two and a five year history of known diabetes respectively.

Males and females with vascular disease were equally represented as in other studies.

Even though the criteria of diabetic control were not adequately recorded in these notes and evidence of search for complications was usually lacking, the prevalence of recorded complications is low. I assume that ketosis, at least, would come to medical attention if it occurred.

Available figures for comparison of the prevalence rates of diabetic complications come mainly from special institutions taking a special interest in diabetics and probably attracting the particularly difficult cases. Accurate community prevalence rates for the complications of diabetes are not available, and terms such as 'skin sepsis', 'pregangrene', 'symptomatic neuritis', and 'blindness', mixed together with the more orthodox headings, do not help us to compare one study with another.

(5) *Diabetic consultations*

In the first National Morbidity Survey general practitioners saw 67.6 per cent of their diabetic patients in one year (General Register Office, 1958). Here 84 per cent had attended their doctor for some reason or another, but only 21 per cent were having regular recorded checks of their diabetic conditions. Sixty-three per cent of patients with a persisting complication were not receiving regular care; in this group increasing age of the patient seemed to be the main factor determining regular follow-up.

Comment

Statistical analysis cannot tell the whole story of medical care in general practice. The regular follow-up of diabetics, or of patients suffering from any other chronic disease, may depend as much on the attitude, personality, intelligence, and culture of the patients

and their relatives, as on the view the doctor may take about long-term care, or his own idiosyncrasies. People with chronic illness are a microcosm of the practice population and include those who are inadequate, depressed, obsessive, and those who do not wish to bother the doctor.

One of the deaths from ketosis in this study arose because the patient decided, for no understandable reason, to reduce his dosage of insulin. A husband and wife, both mild diabetics, were visited for many years because their doctor obtained his eggs from their smallholding. Attempts to wean a patient from hypoglycaemic drugs may never succeed when a senior predecessor has stated, "you must *never* be without these tablets".

Some diabetics, perhaps rightly, do not regard themselves as suffering from an illness, but rather have adjusted to a way of life in which they do not trouble the doctor in the same way as if they had adjusted to deafness or blindness. Many diabetics were seen more often than others because they suffered a concurrent chronic illness which gave them many more symptomatic problems e.g. chronic bronchitis, rheumatoid arthritis.

Such are some of the broader dimensions of general practice. The 'bare bones' of statistical medical audit may never tell the whole story.

Conclusions

The strict recording of the criteria of diabetic control and the regular follow-up of diabetic patients were poor in this practice in the period under study.

Although the prevalence of known diabetes in the population of the practice was comparable to previous studies, female diabetics and patients treated by diet alone were under-represented.

The prevalence of recorded complications was low compared with the few other available figures, and there was little evidence from the records of a systematic search for the presence of complications.

A record based upon the sequential information of multiple consultations over a period of years does not allow the practitioner to be readily aware of the patient's past medical experience or of the factors which may put him at special risk. The present record card used in general practice in the National Health Service is obviously a deterrent to good long-term follow-up of the chronic diseases. The use of special cards, graphical, or tabular methods (e.g. summary cards or adaptation of the principles used for the obstetric card designed by the Royal College of General Practitioners) or a new approach to medical records such as the problem-orientated record (Weed, 1969) would give great stimulus to the better care of chronic disease.

Medical audit may enable us to assess the care of diseases, but who is to set the standards upon which judgments are made? Where are the statistics for the comparison of communities rather than hospital clinics?

General practice is concerned with the care of patients who may have diseases, but who also behave very differently in their reactions to those diseases. If it is difficult to audit the care of diseases, will it ever be possible to audit the care of patients?

Acknowledgements

I thank my partners for kindly allowing me to examine their records and providing me with the names of their diabetic patients.

This study was undertaken while I was Visiting General Practitioner, Department of Community Medicine, Southampton University. I am indebted to Professor J. A. Forbes, Professor of Primary Medical Care, for advice, criticism, and the assistance of members of his department.

The investigation was made possible by the use of funds allocated by the Nuffield Foundation to Primary Medical Care, Southampton Medical School.

REFERENCES

- Andrews, C. T. (1957). *British Medical Journal*, **1**, 427-429.
- Beardmore, M. & Reid, J. J. A. (1966). *British Medical Journal*, **2**, 1383-1384.
- Bodley-Scott, R. (1966). *Price's Textbook of the Practice of Medicine*. London: Oxford University Press.
- British Medical Journal*. (1974). Editorial, **3**, 327.
- Caird, F. I., Pirie, A. & Ramsell, T. G. (1969). *Diabetes and the Eye*. Oxford: Blackwell.
- College of General Practitioners (1960). *Journal of the College of General Practitioners*, **3**, 468-474.
- College of General Practitioners (1962). *British Medical Journal*, **1**, 1497-1503.
- Clute, K. F. (1963). *The General Practitioner*. Toronto: University of Toronto Press.
- Curtis, P. (1974). *Journal of the Royal College of General Practitioners*, **24**, 607-611.
- Donabedian, A. (1966). *Millbank Memorial Fund Quarterly*, **44**, 166-206.
- Fajans, S. S. & Sussman, K. E. (1971). *Diabetes Mellitus, Diagnosis and Management*. American Diabetic Association.
- Fitzgerald, M. G. & Keen, H. (1964). *Lancet*, **1**, 1325.
- Forsyth, G. & Logan, R. F. L. (1962). In *Towards a measure of Medical Care*. Nuffield Provincial Hospitals Trust: Oxford University Press.
- Fry, I. K., Hardwick, C. & Scott, G. W. (1962). *Guy's Hospital Reports*, **111**, 113.
- General Register Office. (1958). *Morbidity Statistics from General Practice*. London: H.M.S.O.
- Jarrett, R. J. (1970). *British Medical Journal*, **3**, 270-1.
- Journal of the Royal College of General Practitioners* (1974). Editorial, **24**, 587-588.
- Letty, L. J. (1961). *Yorkshire Faculty Journal*, July, 4-15.
- Logan, R. F. L. (1953). *General Register Office Studies on Medical and Population Subjects*. No. 7. London: H.M.S.O.
- McWhinney, I. R. (1972). *British Medical Journal*, **2**, 277-279.
- Mahler, R. & Hayes, T. (1973). *Medicine*, **12**, 755-767.
- Marble, A., White, P., Bradley, R. F. & Krall, L. P. (1971). In *Joslin's Diabetes Mellitus*. 11th ed. Lea & Febiger.
- Oakley, W. G., Pyke, D. A. & Taylor, K. W. (1968). *Clinical Diabetes*. Oxford: Blackwell.
- Rubin, A. & Babbott, D. (1958). *Journal of the American Medical Association*, **168**, 498-500.
- Sonksen, P. H. (1972). *British Journal of Hospital Medicine*, 151.
- Stewart-Hess, C. H. (1973). *Journal of the Royal College of General Practitioners*, **23**, 841-860.
- Tomkins, A. M. & Bloom, A. (1972). *British Medical Journal*, **1**, 649-651.
- Walker, J. B. & Kerridge, D. (1961). *Diabetes in an English Community*. University of Leicester Press.
- Weed, L. (1969). *Medical Records, Medical Education and Patient Care*. Cleveland: The Press of Case Western Reserve University.
- White, P. & Graham, C. A. (1971). In *Joslin's Diabetes Mellitus*. 11th ed. Lea & Febiger.
- Wilks, J. M. (1973). *Journal of the Royal College of General Practitioners*, **23**, 46-54.

THE EFFECTS OF CHLORDIAZEPOXIDE IN RESPIRATORY FAILURE DUE TO CHRONIC BRONCHITIS

The effect of normal oral doses (10 mg three times a day) of chlordiazepoxide ('Librium') was studied in a double-blind cross-over trial in seven patients with respiratory failure due predominantly to chronic bronchitis. In six patients the drug caused a highly significant increase in mixed venous carbon-dioxide tension (PCO₂) and a significant fall in forced expiratory volume in one second (F.E.V.₁). In three of these patients serial plasma-chlordiazepoxide levels were measured, and in two they were in the same range as in five non-bronchitic control patients. In the seventh patient, who was subsequently found to have taken a benzodiazepine tranquilliser regularly before the trial, chlordiazepoxide had no effect on the variables measured. Serial plasma-chlordiazepoxide levels in this man were in the same range as in the controls. It is concluded that chlordiazepoxide is contraindicated in patients with respiratory failure due predominantly to chronic bronchitis.