A SURVEY OF GOUT WITHIN GENERAL PRACTICE IN GREAT BRITAIN

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SUMMARY

An epidemiological survey of gout has been conducted within general practice in Great Britain together with a study of the basis of diagnosis in, and the clinical profile of gout patients. In addition, observations have been made on the attitude of general practitioners to the concepts of gout and to the serum urate test. Data were obtained by means of questionnaires completed by doctors and their gout patients.

A biochemical survey of the serum urate profile and the degree of hyperuricaemia within the general non-gout population also is included. Approximately 3,000 blood samples from subjects without gout were obtained; the criteria covering their collection was laid down in a supplied protocol.

Practices with a diagnostic index were selected to be, collectively, as closely representative of the national profile of general practice as possible.

The prevalence of the diagnosis of gout in Great Britain was estimated to be 2.6 per 1,000 population which is in line with other European and North American figures. A significant regional variation was found, with a prevalence for England of 3.0, for Wales 2.1 and for Scotland 1.3 per 1,000. The incidence figures for each of the years 1971 - 1975 followed the same pattern. However, despite these differences the URATE levels were the same for the 3 countries. The reason for the different prevalences has not been fully elucidated, although some reasons have been examined and the work continues.

The diagnosis of gout was almost invariably based on a typical acute joint episode or an appropriate history of such, with a confirmatory

raised serum urate. Overall it would appear that the doctors believed the diagnosis and management of gout to be within the realms of general practice. The clinical profile showed a number of differences from previously published data based on hospital patients and a number of differences also were found in this survey, between the hospital referred and non-referred patients. In the present study 20% of the patients were referred to hospital and they were younger, more often had involvement of a joint other than in the great toe and were more liable to vascular disease.

Thus, this survey of gout in general practice complements the hospital profile studies already reported and provides data on the frequency with which this problem is diagnosed within the British community.

INTRODUCTION

Little has been published on the frequency of the diagnosis of gouty arthritis in Great Britain. In 1953 Kellgren et al[1] found 6 cases covering a 5 year period in a population of 3,515 people which is a prevalence of 1.7 per 1,000 from the random sample of the population of Leigh in Yorkshire. In 1962, Popert and Hewitt[2] detected no one with this diagnosis in the rural area of Wensleydale. During the year 1970-71 an Office of Population Censuses and Surveys[3] publication recorded the number of episodes of gout in England and Wales to be 1.8 per 1,000. In addition, from a literature search, Kellgren estimated the prevalence to be less than 3 per 1,000 of the population of Europe and North America.[4] Other studies had found similar results with 3 per 1,000 in Western Europe[5] and 2.8 per 1,000 in the United States,[6] although a result of 15 per 1,000 has been found in the group of people followed up in the Framingham study.[7] Thus, from studies conducted largely putside Britain, an estimate of the possible frequency of the diagnosis of gout within Great Britain could be guessed. Nevertheless, no national study had been conducted and no firm data were available. The work carried out and reported within this thesis set out to correct this deficiency.

Enquiries conducted among general practitioners practising in a number of different areas of Great Britain confirmed a belief and the statement of Brøchner-Mortensen,[8] that the prevalence of gout could not be assessed within the hospital environment, since most gout patients do not attend hospital. In view of the severity of the pain of an acute attack of gouty arthritis and of the anxiety engendered by the occasional complication plus the frequent association of gout with other chronic conditions, it was felt that most, if not all, patients with clinical gout would be seen within

general practice at some time. Nevertheless, those who experience only the infrequent problem may go some years without being seen by their general practitioner. Thus, records of past clinical gout would be necessary, in addition to any prospective investigation, if all diagnosed cases were to be obtained. A process of random selection of general practices was rejected since it was most unlikely that all, or most, of such practices would agree to participate in a programme likely to represent a not inconsiderable, additional workload. In addition, they would be unlikely, as a group, to have adequate recording systems. Therefore, it was decided to seek a group of practices each with a diagnostic coding system and ideally an age/sex register, to allow identification and quantification of all their gout patients. From this total list of practices a group would be selected which would be judged to be, as near as possible, representative of practice in general within Great Britain. The study revealed a prevalence of 2.6 per 1,000 population within Great Britain which supports estimates based on the findings in continental Europe and North America.

Garrod in 1876 raised the question of regional variation by stating that gout was less common in Scotland than England[9] and although there are no recorded data, it is a frequently repeated belief.[10] Certainly it is established that the prevalence of gout is much higher in some communities than others. The Lennane et al[11] Roturua study showed a prevalence in New Zealanders of European stock to be 3 per 1,000 while in the Maoris dwelling in the same town it was 27 per 1,000. In a study of a hospital population, Decker and Lane[12] found a prevalence of gout in Filipino males twenty-fold greater than that in the non-Filipino males. Others have reported similar

differences and it has been noted from such studies that the frequency of gout and the degree of hyperuricaemia in a community tend to occur somewhat hand in hand.[13] The work which is presented here shows a significant difference in the prevalence of the diagnosis of gout between each of the 3 countries: the prevalence was estimated to be 3.0 per 1,000 in England, 2.1 per 1,000 in Wales and 1.3 per 1,000 in Scotland. In each case the annual incidence of this diagnosis from 1971 - 1975 shows a similar definite difference.

Since this project included a search for possible regional differences in the frequency of the gout diagnosis, and having regard for previous findings which showed, both between[13] and within[7] communities, an association of the level of the serum urate and the frequency of occurrence of gout, it was deemed important to measure the serum urate levels in England, Wales and Scotland. No difference was found in the mean serum urate levels, nor in the frequency of hyperuricaemia for England, Wales and Scotland, which corroborates the recently published findings of Sturge and his colleagues.[14] While it is accepted that the occurrence of clinical gout requires more than a raised serum urate, since non-gout patients may demonstrate levels as high as some gout patients,[7] it is nevertheless curious to note such marked differences in prevalence of gout associated with a seum urate profile which does not vary between the 3 countries.

Although not rare, this study has shown gout to be an infrequent diagnosis within general practice in Great Britain. It is held to be largely a clinical diagnosis with hyperuricaemia as a confirmatory finding.[15] While the finding of monosodium urate

crystals in the synovial fluid from an inflamed joint is accepted as being synonymous with the diagnosis of gout,[16] false negatives do occur.[17] Equally, it is not always feasible to carry out this investigation, although when possible it should be done where the diagnosis is in doubt. On occasions the diagnosis of gout can be difficult[18] and misdiagnoses do occur.[19] Thus the diagnosis is not always clear cut. For this reason it could be fairly argued that it was vital to define what was being assessed and counted as a diagnosis of gout within this study. Nevertheless, since the object of this exercise was to assess the frequency of gout in general practice, the issuing of any diagnostic guidelines could result in a final picture which was not representative of the actual profile within general practice. While no guidelines were given, it was no less important to know what each of the participating doctors diagnosed as gout. This was achieved by obtaining and analysing the clinical features used as diagnostic factors in 602 of the gout diagnosed patients and from an attitudinal survey conducted among the doctors within the participating practices. Overall, it appeared that the group considered gout and gouty arthritis to be synonymous, the diagnosis to be clinical, and like its management to be within the realms of general practice.

This attitudinal survey also sought to assess doctors' attitudes, beliefs and practice in certain matters relating to gout and the serum urate. Each of 160 doctors completed a questionnaire and this revealed that while most doctors request serum urate estimations, 24% stated that they did not believe that the result consistently gave a true reflection of the level within the patient. Many more had some doubt, since they were not prepared to accept the result without confirmation by repeat testing if it was not consistent with what they anticipated clinically.

While there have been reports in the literature of studies on the diagnostic criteria[19, 20], there has been less comment on the problems of diagnosis. For this reason, enquiries were conducted to establish the time interval between the first presentation of clinical features and the diagnosis of gout being made, and also any preliminary diagnoses subsequently changed to gout. This showed the initial diagnosis to be gout in only 3 out of every 5 cases and for the diagnosis to be made without delay in a similar number.

The pattern of gout in a community relates to the genetic predisposition of its people, influenced by environmental factors largely of a socio-economic type with diet believed to be playing a predominant role.[13, 21.] Therefore, although Garrod in 1876 penned an excellent description of gout,[9] the major socio-economic changes in Great Britain during the past 50 years or so may well have influenced the overall description of this condition. In 1970, an excellent profile of gout patients seen in hospital was published by Grahame and Scott[22] and other more limited descriptions have been recorded.[2] However, since initial enquiries confirmed that the majority of gout diagnosed patients are not referred to hospital,[8] and since no detailed description of such patients in the British general practice environment has been published, it was believed worthwhile to review the current overall profile. The investigation revealed that approximately 20% of patients were referred to hospital at some time with more frequent referral among younger patients, those where joints other than the great toe were involved and those with associated vascular disease. Therefore, referral seemed to be more likely if a more difficult diagnostic or

management problem existed. This finding is believed to explain differences such as the male to female ratio, and frequency of involvement of different joints, found in this study from that conducted within a hospital community.[22]

CHAPTER ONE

METHODOLOGY

THE SURVEY OF GOUT DIAGNOSED PATIENTS

Practice Selection

In large measure due to the efforts of the Royal College of General Practitioners, a growing number of practices keep some form of diagnostic index of their patients and many also have compiled age/sex registers. Through representatives of the College in England, Wales and Scotland, as well as personal contacts, lists of practices for possible participation were drawn up. In order that the population sample would be of reasonable size, it was decided that the total population of the practices selected should be not less than 1 in 200 of the total population of England, Wales and Scotland respectively.

At first contact with each practice the aims of the study were explained and a check was made on the following:

1. the keeping of a diagnostic index
2. the keeping of an age/sex register
3. the number of principals in the practice
4. the practice designation - urban, rural, or mixed
5. the year of graduation of each doctor with patients in the practice

A list was compiled of all practices stating that they kept a diagnostic index. This was followed up by ascertaining the date when each of these practices commenced coding gout and whether or not the doctors in each practice were reasonably certain that all such diagnoses had been coded in their diagnostic index. On obtaining satisfactory answers to these two questions, the practice was placed on a list from which the final selection would be taken.

In the hope of achieving a sample representative of general practice within Great Britain, the selection of specific practices was primarily based on whether the practice was designated urban, rural or mixed, and secondly on the number of principals in the practice, so that the proportions of these would reasonably reflect the national profile within England,[23] Wales,[24] and Scotland.[25] Selection was influenced also by an effort to ensure that the geographical location of the practices reflected the population densities of Great Britain. Although not influencing selection, the year of graduation of the participating practitioners was monitored in the hope that it would reflect the national profile of this measurement.[23, 24, 25.] Likewise, a watch was kept on the age/sex breakdown of the sample population against the national profile,[26] since it would be possible to match the above measurements yet have a preponderance of practices with an abnormally high paediatric or geriatric population which could markedly affect the incidence and prevalence figures.

Each participating practice was asked to supply its total list size for each year from 1971 to 1975 for calculation of the annual incidence of new cases for each of these years and the prevalence for 1975. Where the total practice was not coded in the diagnostic index, the practice was asked to supply the total population which was indexed. Practices were asked to supply an age/sex breakdown of their 1975 coded patient list.

The survey data were collected from the participating practices by use of questionnaires. Of the 64 practices, 49 were visited and regular contact with all was maintained by telephone.

Questionnaires

Data were collected by questionnaire for each gout patient, and covered the basis of diagnosis and the clinical profile of the case, and in addition an attitudinal survey was conducted among the doctors in the participating practices.

Questionnaire I, (Appendix I). In the first instance all co-operating doctors were asked to provide limited data on all recorded gout diagnosed patients. This required a one line entry per patient and was carried out during the latter part of 1974.

Questionnaire II, (Appendix II). From the returned Questionnaire I results it was apparent that to ask for a Questionnaire II to be completed on every patient would present a very heavy workload for the participating doctors and that sufficient data could be obtained by having this questionnaire completed for the several hundred cases diagnosed from January 1st, 1971 and continued to December 31st, 1975. This would provide, in addition to the limited retrospective data from case records for all patients diagnosed prior to 1971 (Questionnaire I), detailed retrospective data on all cases diagnosed from January 1st, 1971 to December 31st, 1974, and data collected on each diagnosis as it was made during the course of 1975. The study was concluded on December 31st, 1975.

Questionnaire III, (Appendix III). This questionnaire was sent, via the general practitioner, to each patient on whom a Questionnaire II was completed. The questionnaire was sent with a covering letter (Appendix IIIa) and a stamped envelope, addressed to:
DR. W. J. C. CURRIE at Berkhamsted.

Questionnaire IV (Appendix IV). This was sent to doctors within the participating practices and attempted to assess the doctor's attitude to certain matters relating to the estimation of the serum urate, and to gout, with particular reference to its diagnosis.

Pilot Studies

After detailed discussions with an epidemiologist and members of the Royal College of General Practitioners at Birmingham, Swansea and Dundee, the questionnaires were drafted. These were then sent to several general practitioners for comment before being finalised.

Prior to the study getting underway the author completed the documentation of Questionnaires I and II in conjunction with 2 practices. In addition, Questionnaire III was sent out to relevant patients and Questionnaire IV completed by the general practitioners. This pilot study within the 2 practices highlighted certain problems of question interpretation which were corrected. After this the materials were sent to 5 practices and no additional problems being encountered the project was set in full motion.

Statistical Analysis

The statistical analyses of the gout data were performed mainly by the Chi-squared test with Yates correction. In the attitudinal survey, where a doctor cell-size was 5 or less, Fisher's more exact test was used. Where other techniques have been employed, these are declared with the results.

THE SERUM URATE PROFILE STUDY IN SUBJECTS WITHOUT GOUT

The Validation Study of the Postal Method of Collection

The question of sample degradation during transportation in the postal system to the laboratory was investigated. Thirty-four samples from volunteers were taken by venepuncture after an overnight fast of at least 12 hours, and divided into 4 aliquots, each being placed in a clean dry container. The first was tested within 2 hours of being taken and the other 3 were each placed in identical packaging material to that used in the main study. These packaged samples were then posted at varying intervals from different centres, so as to arrive at one to 5 days after being taken, and thus allow measurement of the degree of degradation against the 2 hour sample.

Practice and Patient Selection of Subjects without Gout

Practices were selected to ensure representation of both rural and urban communities and also of the regions' more and less affluent areas within England, Wales and Scotland, since environmental factors can influence the serum urate.

Patient selection criteria were laid down within a protocol (Appendix V) which asked each participating doctor for samples from 60 patients made up of 5 males and 5 females within each of the age groups 15 - 24, 25 - 34, 35 - 44, 45 - 54, 55 - 64, and 65 years and above. It was stressed that patients should not be specially selected, although certain patients would be excluded. Those to be excluded were patients on drugs (list within protocol) which were known to affect the level of the serum urate, and where the drug could not be stopped for an adequate washout period. Also excluded were patients with a history of jaundice and, of course, those not wishing

to volunteer. It was agreed that patients would be invited to return fasting. Together with a sample of blood, data was collected on the patients' age, sex, occupation, height, weight, blood pressure, diagnosis which brought the patient to surgery, all chronic medical problems suffered by the patient, and whether or not the patient had a family history of gout.

All samples were collected by venepuncture in the morning after an overnight fast of 12 hours' minimum, placed in a clean dry container and posted the same morning to Berkhamsted for testing. Samples were confined to Monday, Tuesday and Wednesday to avoid samples being delayed in the postal system over the weekend, and the date they were taken noted on the tube. Their subsequent date of arrival was also noted.

The request for the patients to return fasting was required because a study of the lipid profile of these patients was to be carried out from the same blood samples.

Random Sample Study in Subjects without Gout

It was felt that to obtain a large number of samples by a truly random method was unlikely to succeed; however, to assess what possible bias the selection method had created, a smaller number of samples was collected by a random process using the method of Fisher and Yates.[27] Of the doctors participating in the main biochemical study, the 27 who were first to finish were asked to participate in this random study. Each doctor was asked to provide an agreed number of specimens equally divided between males and females. The importance of collecting all samples was stressed. As well as collecting data relative to the patient, such as height and

weight, a list of drugs the patient was taking was also noted.

Laboratory Methods, Standardisation and Quality Control.

Methods. The first 563 serum urate estimations of the main biochemical survey covering 2886 samples, were done by the Urica-quant manual method.[28] All other serum urate estimations were by the uricase method of Praetorius and Poulson[29] which became available in the laboratory. They were performed on the Centrifichem analyser. The changeover was considered to be satisfactory in view of published data showing that the results of both methods were comparable,[30, 31] and from results of a series of samples tested in the laboratory by both methods.

Serum urea nitrogen was measured by the method of March et al[32] as modified for the auto-analyser I (Technicon Methodology NIc).

Both the serum urate and urea nitrogen were estimated in milligrams per 100 millilitres. To conform with the Systeme International d'Unites, the serum urate results have been converted to μmol/litre by using the conversion factor 59.5. The serum urea nitrogen results were converted to mmol/litre of serum urea by the use of the conversion factor 0.356 which includes the conversion of serum urea nitrogen to serum urea as well as the milligrams per 100 millilitres to millimols per litre.

Standardisation. A one point standardisation using 357 μmol/litre (6.0 mg/100 ml) aqueous standard supplied by Boehringer was employed for the Urica-quant procedure.[28] The method was checked for linearity up to 714 μmol/litre (12 mg/100 ml).

For the uricase method[29] a one point standardisation was used employing Boehringer 476 μmol/litre (8.0 mg/100 ml) aqueous standard (Preciset). The method was checked for linearity up to 714 μmol/litre (12.0 mg/100 ml).

The standardisation for the serum urea nitrogen estimations[32] employed 6 aqueous standards supplied by Sigma. These standards were 3.56 mmol/litre (10 mg/100 ml), 10.68 mmol/litre (30 mg/100 ml), 17.8 mmol/litre (50 mg/100 ml), 24.92 mmol/litre (70 mg/100 ml), 35.6 mmol/litre (100 mg/100 ml) and 53.4 mmol/litre (150 mg/100 ml).

Quality Control. In the case of the Urica-quant method,[28] a sample of Precilip was included with each batch of unknown serum samples.

In the case of the uricase method,[29] a sample of Precilip was included with each batch of unknown serum samples.

For the serum urea nitrogen estimations,[32] a sample of Wellcomtrol quality control serum was included with each batch of unknown serum samples.

Statistical Analysis

Analysis of the results was carried out by doing a mean and standard deviation of groups being compared. On a number of occasions the Students "T" test was employed. Where any other procedure has been employed this has been stated in the results section.

Patient Consent

In all cases where a blood sample was requested, the patient was informed of the reason for the request and in the case of the main biochemical survey, this was done orally at the time the patient was asked to return in a fasting state. For the validation study, this was explained when requesting volunteers, while in the random sampling it was first explained by letter.

CHAPTER TWO

RESULTS OF THE SURVEY OF GOUT DIAGNOSED PATIENTS

QUESTIONNAIRE RETURNS

Questionnaire I

All 64 practices promptly completed and returned the first questionnaire and responded to an enquiry during 1976 to ascertain how many of the patients, originally listed as diagnosed prior to the 1st January, 1971, were still alive and a patient within their practice on the 31st December, 1975.

Questionnaire II

This questionnaire was completed and returned for all patients listed in Questionnaire I where the diagnosis had been made on or after the 1st January, 1971. In addition, all 64 practices completed a questionnaire for each patient diagnosed subsequent to the completion of Questionnaire I and up to the 31st December, 1975, when the study closed. Although not solicited, 60 of the practices completed a Questionnaire II for patients diagnosed during 1969 and 1970. During 1976 all 64 practices confirmed how many, if any, of their Questionnaire II patients had died or moved from their practice up to the 31st December, 1975.

Including questions receiving a "don't know" answer, of the 604 questionnaires, 383 were completed in every respect. The remaining 221 had the very occasional unanswered or incompletely answered question. With the rare exception these related to an uncertainty as to whether all acute attacks had been recorded.

Questionnaire III

This, plus a covering letter, was sent to all 604 patients for whom a Questionnaire II was received. A return was obtained from 492 (81.5%) of the patients and these were fully completed by 456 of the patients. In the remaining 36 questionnaires, only the very occasional answer was not completed. In 6% of cases the year of diagnosis, as stated by the patient, disagreed with that in the doctor's return. This difference was never more than 1 year and by reference to the month of the first attack could have been only one to four months. In 4 cases where the month of the 1st attack was not available from the questionnaire (that is, diagnosed 1969 or 1970) the information was obtained during direct communication with the doctor. Due to the close proximity of the 2 dates, and accepting that the doctor had a recording system while the patient was likely to be relying on memory, the year of diagnosis as declared by the general practitioner was taken in all cases.

Questionnaire IV

This attitudinal questionnaire was sent to all 160 doctors whose patient lists were involved in the study. A return was obtained from 151. All practices were sent one or two spare questionnaires and each of the additional 41 doctors within these practices, who were not participating in the study, were invited to complete one of these questionnaires. Nine of these were completed making 160 returns. One hundred and forty-six were completed in every respect and the remaining 14 had only the occasional unanswered question.

PRACTICES SELECTED

Of 145 practices contacted, 4 failed to reply to a written communication on 2 separate occasions. A refusal to co-operate was given by 3 practices. 61 practices replied, stating that they would not help because they had either stopped keeping an index; had never kept an index, although they had thought about it; or their index did not include gout and covered only a specialised subgroup of their practice such as paediatric patients. Three practices said they could help, but would prefer not to since they were fully stretched on research projects of their own. Agreement to participate was received from 74 practices. 63 of these agreements to participate were taken up and since the remaining 11 were in areas already well represented and the overall sample for each of the 3 countries exceeded the 1 in 200 sample of the population, these were not included. However, the North West of Scotland was not represented and although it is sparsely populated, it was felt desirable to include a practice from that area since the question of gout being less frequent in Scotland was to be examined. No practice in that area, which kept a diagnostic index could be found. Since the area has a stable patient and doctor population and practice size tends to be small, it was felt fair to incorporate a practice in Sutherland of 800 patients. The doctor was well acquainted with his patients and happy to check his records. Thus a total of 64 practices were recruited. The distribution of these practices is shown on the map following this page.

Table 1 defines the practice population size, its ratio to the total population, the number of practices involved, and the number of

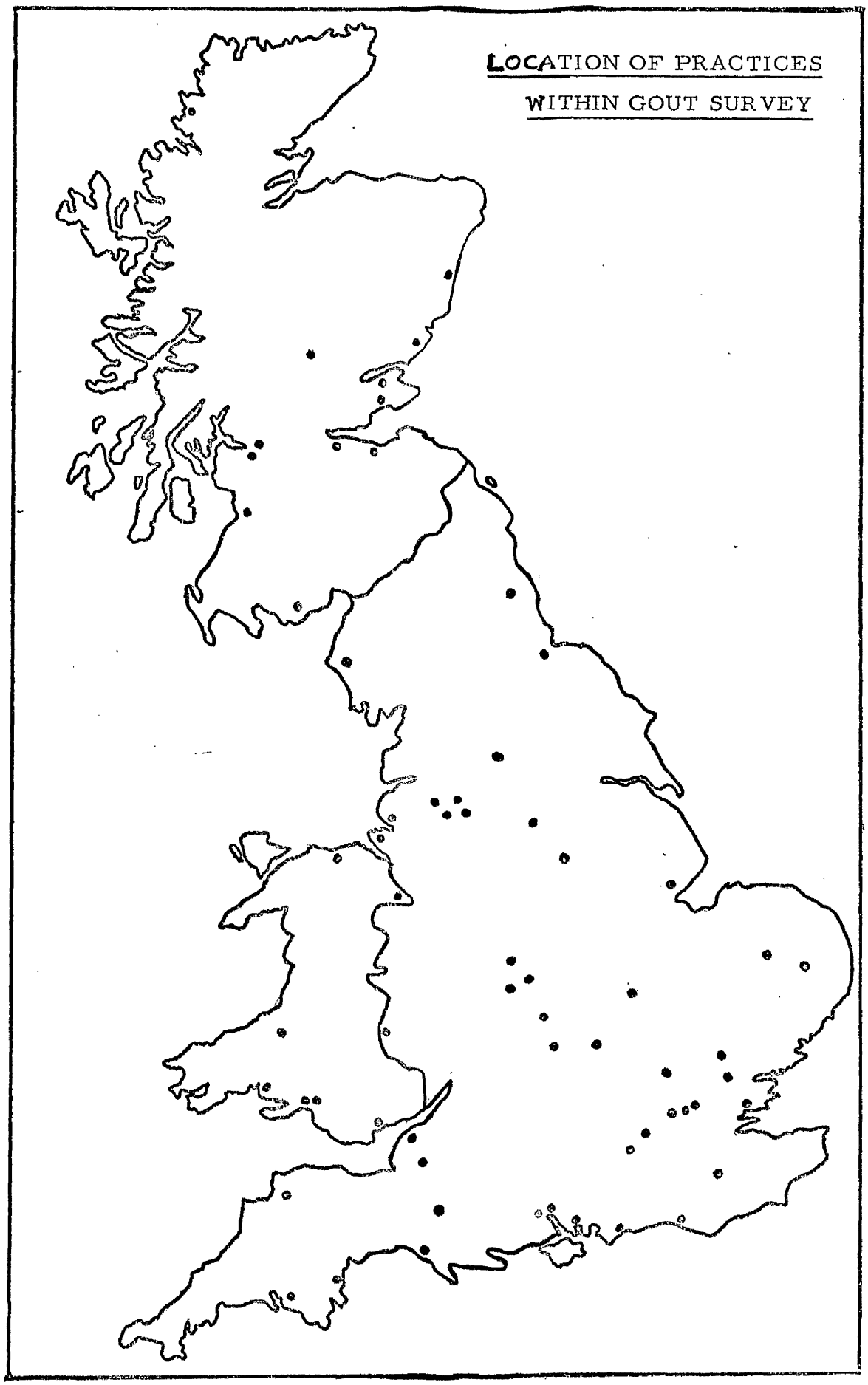

LOCATION OF PRACTICES
WITHIN GOUT SURVEY

TABLE 1

PROFILE OF POPULATION SAMPLE

Location	(1) Practice Population	(2) National Population x 10^6 (1973)	Ratio of (1) to (2)	No. of G.P.'s	No. of Practices
Great Britain	374, 832	54.386	1 : 145	160	64
England	259, 001	46.425	1 : 179	101	45
Wales	40, 526	2.749	1 : 68	22	7
Scotland	75, 305	5.212	1 : 69	37	12

participating principals within these practices. Because of the small size of the Scottish and Welsh populations compared with that of England, a relatively larger sample was taken in the first 2 countries. While the total practice population size was 374,832 in relation to the age and sex analyses (Tables 7a & 7b), the total population was 258,091 which excludes 8 practices which did not have an age/sex register and 78,752 under 15 year olds from the remaining 56 practices. There were an additional 41 principals within these practices whose patients were not included.

Because of the way in which national statistics for England and Wales are kept, it was necessary to compare the number of doctors rather than the actual number of practices for the urban, rural, mixed comparison. Since the definition relates to the number of doctors within a practice who receive a rural payment, it was necessary to use the total complement of 201 practitioners within the 64 practices, rather than using only the 160 whose patients were included in the study. By the Chi-squared test the urban/rural/mixed split (Table 2) gave a good fit for Wales and Scotland, but showed there to be too many of the mixed grade in the English practices (X_2^2 = 19.0 : 0.1% level). By the same test, the split over size of practice (Table 3) showed a good fit for all three countries, although for Great Britain as a whole the proportion of large practices was somewhat too high (X_2^2 = 6.0 : 5.0% level). The check on the doctors by year of graduation shows a similar profile to the national statistics with the exception of Scotland where the sample has too many younger doctors (X_2^2 = 9.4 : 1.0% level) (Table 4). Monitoring of the age/sex profile of the sample population confirmed that for both sexes, the percentage of the sample that fell into each of the four age groupings was the same for the sample population as for the nation as a whole. (Table 5).

TABLE 2

PERCENTAGE OF PRINCIPALS BY PRACTICE DESIGNATION

(URBAN, RURAL, MIXED)

The number in each sub-group expressed as a percentage of the total practitioners stated at the top of each column. Columns 1 relate to the study group and Columns 2 to the official national data.

Designation	Great Britain		England		Wales		Scotland	
	1 % of 201	2 % of 23, 968	1 % of 131	2 % of 19, 997	1 % of 25	2 % of 1, 272	1 % of 45	2 % of 2, 699
Urban	69	74	69	76	76	63	65	66
Rural	20	21	24	22	20	36	9	12
Mixed	11	5	7	2	4	1	26	22

TABLE 3

RATIO OF SINGLE-HANDED, SMALL AND LARGE GROUP PRACTICES

Numbers in each sub-group are expressed as a percentage (%) of the total practices in that country quoted at top of each column, both for the study group (Columns 1) and the official national data (Columns 2).

Number of Principals	Great Britain		England		Wales		Scotland	
	1 % of 64	2 % of 10,803	1 % of 45	2 % of 9,039	1 % of 7	2 % of 548	1 % of 12	2 % of 1,216
1	30	40	33	41	29	34	16	40
2 or 3	39	43	36	42	29	49	58	44
4 or more	30	17	31	17	42	17	25	16

TABLE 4

YEAR OF GRADUATION

Numbers in each sub-group expressed as a percentage (%) of total doctors in that country quoted at the top of each column, both for the study group (Columns 1) and the official national data (Columns 2).

Year Bands	Great Britain		England		Wales		Scotland	
	1 % of 160	2 % of 25,424	1 % of 101	2 % of 21,358	1 % of 22	2 % of 1,269	1 % of 37	2 % of 2,699
pre-1945	17	25	17	26	14	23	19	25
1946-55	27	31	34	30	23	32	11	34
1956-65	29	27	27	27	32	28	32	25
1966-75	20	17	15	17	27	17	30	16
Unknown	7	0	7	0	4	0	8	0

TABLE 5

AN AGE/SEX COMPARISON OF THE STUDY POPULATION WITH THE TOTAL POPULATION FOR GREAT BRITAIN

Age/sex Groupings	Study Population		Great Britain Population	
	Number (10^3)	%	Number (10^3)	%
Total	336.843	100	54,522	100
Males				
Total	161.892	48	26,551	48
0 - 14 years	39.868	25	6,569	25
15 - 44 years	66.235	41	10,860	41
45 - 64 years	35.984	22	6,204	23
65 & over years	19.805	12	2,918	11
Females				
Total	174.951	52	27,971	52
0 - 14 years	38.884	22	6,231	22
15 - 44 years	70.637	40	10,501	38
45 - 64 years	37.606	22	6,611	23
65 & over years	27.824	16	4,628	17

PATIENT NUMBERS AND SELECTION

Patient Numbers

From the 64 practices, 1077 patients diagnosed as gout sufferers were identified. On the 31st December, 1975, 966 of these patients were alive and still patients within the study population practices. These patients were used to calculate the prevalence of gout. Detailed data covering the basis on which the diagnosis was made and the clinical profile of the cases were collected on 604 cases. This 604 consisted of 532 patients diagnosed in the years 1971 to 1975 inclusive, plus 72 patients diagnosed during 1969 and 1970 and returned from 60 of the practices. The data collected on the rest of the 1077 patients (473 cases) were as shown in Questionnaire I.

Patient Selection

Details were sought of the criteria used in establishing the diagnosis of gout in 604 cases, and obtained in 602 cases. The general attitude of the practitioners in making this diagnosis was established by means of an attitudinal survey and it became evident from both the basis of diagnosis in the 602 cases studied and from the attitudinal survey that, almost invariably, gout represented a deposition of sodium urate in or around a joint resulting in an episode of acute gouty arthritis or an acute extra articular episode such as bursitis. In 9 cases the diagnosis was first made on the finding of a tophus. In each of these cases, the patient subsequently developed an acute arthritis during the period of the survey. In 3 additional cases, the diagnosis was made in patients who had a renal

stone and a raised serum urate plus or minus a family history of gout. These 3 cases have been excluded from the entire gout survey as were 5 other cases who had not experienced an acute gouty articular/extra-articular episode, thus giving the group a uniform basis of diagnosis.

Details of the 602 diagnoses are to be found in the section entitled "Diagnosing Gout in General Practice" and details of the attitudinal survey are contained in the section "An Attitudinal Survey of the Diagnosis of Gout".

THE PREVALENCE AND INCIDENCE OF GOUT

Prevalence

On the 31st December, 1975, there were 966 diagnosed cases of gout, alive and resident within the total study population. The individual numbers for England, Wales and Scotland were 780, 85, and 101 respectively. Based on 966 diagnosed cases of gout, the prevalence in Great Britain was estimated to be 2.6 per 1,000. Of these 966 cases, 97 (10%) were considered to be secondary gout. This gives a prevalence for primary gout of 2.3 per 1,000 if we include the 7% of cases where the doctor was uncertain, but where there was no obvious reason to believe that secondary gout was present. The prevalence results (Table 6) show England to have a significantly greater prevalence than the rest of Great Britain (X_1^2 = 60.8 : 0.1% level) and Wales to have a significantly greater prevalence than Scotland (X_1^2 = 8.9 : 1.0% level). The prevalence for England and Wales combined was 2.9 per 1,000 of the sample

TABLE 6

1975 PREVALENCE RATES, NUMBER OF GOUT PATIENTS AND SAMPLE POPULATION

Region	No. of Gout Patients	Sample Population Size	Prevalence per 10^3
Great Britain	966	374,832	2.6
Scotland	101	75,305	1.3
Wales	85	40,526	2.1
England	780	259,001	3.0
North	85	31,072	2.7
North West	50	31,666	1.6
Yorkshire & Humberside	37	12,610	2.9
East Midlands	68	29,049	2.3
West Midlands	235	41,991	5.6
East Anglia	54	11,245	4.8
South East	186	83,115	2.3
South West	65	18,253	3.6

population which is significantly greater than the prevalence for Scotland at the 0.1% level ($X_1^2 = 55.6$). The results for each region within England shows considerable variation with the prevalence in the North being less than that in the South. Peak prevalence was recorded in the West Midlands and in East Anglia, the difference from the other English regions being highly significant at the 0.1% level in both cases ($X_1^2 = 110.2$ for the West Midlands and $X_1^2 = 11.9$ for East Anglia).

Incidence

A significant difference was noted when the incidence of new cases for 1971/72 was compared with that for 1974/75 for the total English results ($X_4^2 = 9.7$: 5.0% level) and for the West Midlands results ($X_4^2 = 18.1$: 1.0% level). For the other English regions, for Scotland, Wales and Great Britain, as a whole, the differences in incidences quoted (Table 7a) were not found to be significant. Table 7b contains the actual number of new cases per year for each defined country and the sample population for that year. Table 7c contains the same information for the 8 English regions.

Prevalence by Age and Sex

The prevalence figures subdivided by age and sex (Table 8a) for males shows that there are significantly more diagnoses of gout in the 15 - 44 year subgroup in England than in Wales plus Scotland ($X_1^2 = 6.3$: 5.0% level) and that in the 45 - 64 year subgroup there are significantly more in England plus Wales than in Scotland ($X_1^2 = 32.4$: 0.1% level). In the over-65 year age sub

TABLE 7a

INCIDENCE OF NEW CASES OF GOUT DIAGNOSES

Region	Incidence per 1,000 population				
	1971	1972	1973	1974	1975
Great Britain	0.26	0.25	0.33	0.35	0.30
Scotland	0.12	0.16	0.17	0.27	0.17
Wales	0.36	0.26	0.13	0.25	0.17
England	0.29	0.27	0.41	0.39	0.35
North	0.26	0.26	0.49	0.16	0.35
North-West	0.26	0.18	0.07	0.29	0.32
Yorkshire & Humberside	0.09	0.28	0.37	0.16	0.56
East Midlands	0.23	0.29	0.36	0.32	0.17
West Midlands	0.35	0.39	0.69	1.02	0.71
East Anglia	0.53	0.54	0.45	0.18	0.00
South East	0.27	0.17	0.42	0.26	0.30
South West	0.38	0.43	0.26	0.45	0.16

TABLE 7b

THE NUMBER OF NEW GOUT CASES DIAGNOSED AND THE POPULATION SAMPLE FROM WHICH THEY WERE DRAWN FOR EACH YEAR FROM 1971 TO 1975 FOR GREAT BRITAIN, SCOTLAND, ENGLAND AND WALES.

Region	1971	1972	1973	1974	1975
Great Britain	82/317549	89/355806	121/363247	129/369343	111/374832
Scotland	9/72408	12/73186	13/74300	20/74889	13/75305
Wales	10/27492	10/37971	5/39292	10/40707	7/40526
England	63/217649	67/244649	103/249655	99/253747	91/259001

Foot Notes:

1. The numerator represents the actual number of new cases and the denominator the population sample.
2. One English practice was unable to supply its total practice size for 1971 & 1972 and a further 3 English practices were unable to supply this information for 1971 only. These practices have been excluded from the incidence calculations which therefore cover 60 practices for 1971, 63 for 1972 and 64 for 1973-75.

TABLE 7c

THE NUMBER OF NEW GOUT CASES DIAGNOSED AND THE POPULATION SAMPLE FROM WHICH THEY WERE DRAWN FOR EACH YEAR FROM 1971 TO 1975 FOR THE STATED ENGLISH REGIONS.

Regions of England	1971	1972	1973	1974	1975
North	8/30212	8/30377	15/30560	5/30703	11/31072
North West	7/27437	5/28009	2/28732	9/31207	10/31666
Yorkshire & Humberside	1/10755	3/10823	4/10672	2/12173	7/12610
East Midlands	6/26523	8/27170	10/27867	9/28004	5/29049
West Midlands	14/40521	16/40846	29/42250	43/41986	30/41991
East Anglia	6/11219	6/11180	5/11120	2/11200	0/11245
South East	14/52800	13/77682	33/79470	21/80527	25/83115
South West	7/18182	8/18562	5/18984	8/17947	3/18253

Foot Notes: 1. & 2. See Table 7b.

TABLE 8a

1975 PREVALENCE RATES, NUMBER OF GOUT PATIENTS AND POPULATION SIZE FOR EACH AGE SUB-GROUP, FOR MALES.

Region	Measurement	Age Grouping (Years)			
		All 15+	15 - 44	45 - 64	65 +
Great Britain	Prevalence/10^3	6.1	1.7	10.6	12.2
	Gout Patients - by age	744	113	383	242
	Age unknown	6	-	-	-
	Population size	122024	66235	35984	19805
England	Prevalence/10^3	7.3	2.0	12.5	14.8
	Gout Patients - by age	590	86	303	201
	Age unknown	4	-	-	-
	Population size	80395	42612	24223	13560
Wales	Prevalence/10^3	5.2	1.7	10.9	6.2
	Gout Patients - by age	70	12	44	14
	Age unknown	1	-	-	-
	Population size	13549	7263	4036	2250
Scotland	Prevalence/10^3	2.8	0.9	4.7	6.8
	Gout Patients - by age	78	15	36	27
	Age unknown	1	-	-	-
	Population size	28077	16360	7725	3992

group diagnoses are significantly greater in England than Wales plus Scotland (X_1^2 = 23.1 : 0.1% level). For all males the diagnosis of gout is found significantly more often in England than Wales and in Wales than Scotland. Nevertheless, this result must be taken guardedly, as it is statistically not independent of the above results. For females (Table 8b) in the 45 - 64 year subgroup the prevalence in England is greater than that in Wales plus Scotland (X_1^2 = 7.8 : 1.0% level).

TABLE 8b

1975 PREVALENCE RATES, NUMBER OF GOUT PATIENTS AND POPULATION SIZE FOR EACH AGE SUB-GROUP, FOR FEMALES.

Region	Measurement	Age Grouping (Years)			
		All 15+	15 - 44	45 - 64	65+
Great Britain	Prevalence/10^3	1.0	0.1	1.3	3.0
	Gout Patients - by age	143	9	49	83
	Age unknown	2	-	-	-
	Population size	136067	70637	37606	27824
England	Prevalence/10^3	1.3	0.1	1.7	3.5
	Gout Patients - by age	111	6	42	63
	Age unknown	2	-	-	-
	Population size	88856	45883	24749	18224
Wales	Prevalence/10^3	0.5	0.1	0.2	1.8
	Gout Patients - by age	8	1	1	6
	Age unknown	0	-	-	-
	Population size	15043	7420	4303	3320
Scotland	Prevalence/10^3	0.7	0.1	0.7	2.2
	Gout Patients - by age	22	2	6	14
	Age unknown	0	-	-	-
	Population size	32168	17334	8554	6280

DIAGNOSING GOUT IN GENERAL PRACTICE

Pre-Diagnostic Time Lag

Data on 557 of the 604 cases were available on the time lag between the symptoms of gout first occurring and the diagnosis being made. In 43 cases the doctor was uncertain of the precise interval, although in all cases it was in excess of 2 months. The data were totally unavailable in the remaining 4 cases. The percentage of cases diagnosed within the lag times specified in Table 9 varied little by geographical location, type or size of practice. An immediate diagnosis was made in 62.3% of the 462 males, but in only 54.7% of the 95 females. This difference is not significant by the Chi-squared test and by the second month the difference was no longer present. Although not included in the table, the diagnosis was made on the spot in 366 cases and at an early subsequent visit in the other 6 of the 375 cases diagnosed within the first month.

The frequency of a time lag exceeding 2 months was studied in the group presenting with podagra and this was found to be 19.4% (69 of 356) which compared with a lag exceeding 2 months in 36.4% (88 of 242) with other presentations. This result is highly significant (X_1^2 = 24.2 : 0.1% level).

Initial Diagnosis

In 61.3% of cases the initial diagnosis was gout while in 16.9% of the 600 cases studied no preliminary diagnostic label was given. The various preliminary diagnostic groups of the remaining 21.8% of cases are shown in Table 10.

TABLE 9

AN ANALYSIS OF THE PRE-DIAGNOSTIC TIME-LAG AMONG 600 GOUT PATIENTS.

Time-Lag Interval	Number of Patients (% of 600 cases)
Less than 1 month	375 (62.5)
1 - 2 months	34 (5.7)
2 - 12 months	55 (9.2)
1 - 2 years	28 (4.7)
3 - 4 years	34 (5.7)
5 & more years	31 (5.2)
Uncertain	43 (7.2)

TABLE 10

INITIAL DIAGNOSIS RECORDED IN 600 GOUT CASES

(each sub-group expressed as a percentage of the 600 cases)

Preliminary Diagnosis	Number (%)		
Gout	368 (61.3)	Injury	8 (1.4)
Arthritis (other than gout)	76 (12.7)	Strain	7 (1.2)
Infection	15 (2.4)	Bursitis/ synovitis	7 (1.2)
Rheumatism	10 (1.7)	Others	7 (1.2)
No preliminary diagnosis			102 (16.9)

Hospital Diagnosis and Referral

The information relating to hospital referrals in relation to gout was fully documented in 598 of the 604 cases and is shown in Table 11. In toto, 122 (20.4%) of the gout diagnosed patients were seen in hospital for diagnosis or subsequent management advice. A breakdown of the referral rate to hospital by location size and type of practice showed little variation. The only exception to this was that, while there was no significant difference between referral from urban and mixed practices, there were significantly fewer referred from rural practices. From 115 rural patients, 11 were referred, while from 400 urban plus mixed patients, 101 were referred and this is significant at the 1.0% level ($X_1^2 = 7.1$). It should be stressed that hospital diagnoses include diagnosis by a specialist in centres other than a hospital and that general practitioner diagnoses cover diagnosis by the patient's own doctor, a partner (present or past) or, occasionally, by a previous practice.

Diagnostic Factors

The features used in coming to the diagnosis of gout are shown in Table 12. Here again there were no differences noted when the data were examined by practice location, size and type. These data were obtained in adequate form from 602 of the 604 cases and the results are shown in Table 12. It should be noted that the 1.5% of patients with an absent clinical history were 9 cases where the diagnosis of gout was made on the basis of a tophus, in patients with no other complaint. In each case acute gouty arthritis has subsequently been documented. In the 6.7% of cases where acute arthritis is recorded as absent, it should be remembered that this relates only to the point in time at which the diagnosis was made and in these cases the diagnosis was established on the clinical history of an acute attack

TABLE 11

FREQUENCY OF HOSPITAL REFERRAL AMONG 598 GOUT PATIENTS

(all percentage figures relate to the total 598 patients)

Total Number of Patients (%)	No. of Hospital Diagnoses (%)	No. of Hospital Diagnoses referred back to Hospital (%)	No. of Practice Diagnoses (%)	No. of Practice Diagnoses referred to Hospital (%)
598 (100%)	47 (7.9)	36 (6.0)	551 (92.1)	75 (12.5)

TABLE 12

PRESENCE OF DIAGNOSTIC FACTORS IN 602 GOUT DIAGNOSED PATIENTS

(For each factor the results are expressed as a percentage of total 602 cases).

Factors	Present	Absent	Not done or not recorded
Clinical History	89.9	1.5*	8.6*
Family History	11.0	36.2	52.8
Acute Arthritis	89.6	6.7*	3.7*
Rheumatic Pains	20.6	58.3	21.1
Tophi	3.8	78.4	17.8
Raised S.U.A.	78.6	6.3	15.1
Urate Crystals from synovial fluid	3.0	0.8	96.2
Diagnostic X-ray	4.2	14.1	81.7
Response to colchicine	14.1	8.0	77.9
Response to phenyl-butazone/Indocid	54.5	2.8	42.7

*See results

plus a varying number of other listed factors. Equally, confusion may occur by Table 12 showing that the clinical history was 'not done or not recorded' on 8.6% of occasions. In the main these cases had been diagnosed in a previous practice and the notes lacked detail and were sometimes limited to no more than a statement such as "gout - left great toe" and a note of the medication. The 3.7% acute arthritis under 'not done or not recorded' is made up of extra-articular cases such as bursitis, plus 4 cases where the information was not obtained. Table 13 shows the frequency with which one or more of the factors in Table 12 were used in establishing the diagnosis.

It was surprising to note that the presence or absence of a family history had only been noted in 47.2% (284 patients) of the gout patient records (Table 12) and that its presence was recorded in 11% (66 patients) of the total cases or 23.2% of the 284 where the data had been recorded. Information on family history was available from 456 of the patient questionnaires (Questionnaire III) and a positive family history was claimed on 106 occasions (23.3%).

Prior to the first attack of gouty arthritis, 37% of patients had complained intermittently of joint pains, 2.9% had a history of renal calculus, 1.7% had a nodule present, which turned out to be a tophus and in 6.3% of cases the doctor was aware of a history of gout in the patient's family.

TABLE 13

THE FREQUENCY OF USE OF 1 OR MORE DIAGNOSTIC FACTORS LISTED IN TABLE 4 IN 602 CASES

No. of factors	% of 602
1	2.3
2	7.8
3	33.4
4	38.6
5	11.1
6	5.8
7	1.0

PROFILE OF THE GOUT PATIENT

Age of Onset and Sex

The age of onset of the clinical presentation of gouty arthritis in 557 patients is shown in Table 14, and this shows a similar sub-grouping by age for both sexes, but with the females' onset pattern running about a decade behind that of the males. The mean age at the time of the first attack was 52.3 years for all cases, 50.8 years for men and 59.7 years for women. Among the total 1077 cases there were 168 females (15.6%) giving a male to female ratio of 5.4 : 1, although the ratio of prevalence of males to females in this study group is 6.1 : 1 (See Tables 8a and b).

Weight

In 479 patients the percentage variations in weight from that predicted in acturial tables of weight[33] taking account of the individual's age, sex, and height, showed 53 (11.1%) of the patients to be 10% or more underweight, 231 (48.2%) to be $\pm$ 10% of the expected and 183 (38.2%) to be in excess of 10% overweight. For the remaining 12 (2.5%) cases there were no available acturial figures.

The mean weight in kilograms, and standard deviation for the male and female patients were 81.1 $\pm$ 11.4 and 68.7 $\pm$ 11.9 respectively. Since no such figures are available for the general population of Great Britain it was decided to compare them with the mean weights of the 1421 males and 1465 females who are included in the non-gouty biochemical study. This group had a mean and standard deviation of 72.6 $\pm$ 11.3 and 61.5 $\pm$ 11.4 for the males and females respectively. Statistical analysis shows the gouty males (X_1^2 = 163.6) and females (X_1^2 = 28.67) to be significantly heavier than the non-gout population at the 0.1% level.

TABLE 14

AGE OF ONSET IN 557 CASES DIAGNOSED AS HAVING GOUT

Sex	Nos.	Age at onset in years							
		15 - 24	25 - 34	35 - 44	45 - 54	55 - 64	65 - 74	75+	Unknown
Males	462 (100%)	8 (1.7)	39 (8.4)	101 (21.9)	108 (23.4)	102 (22.1)	64 (13.9)	31 (6.7)	9 (1.9)
Females	95 (100%)	1 (1.1)	5 (5.2)	6 (6.3)	20 (21.1)	18 (18.9)	25 (26.3)	18 (18.9)	2 (2.1)

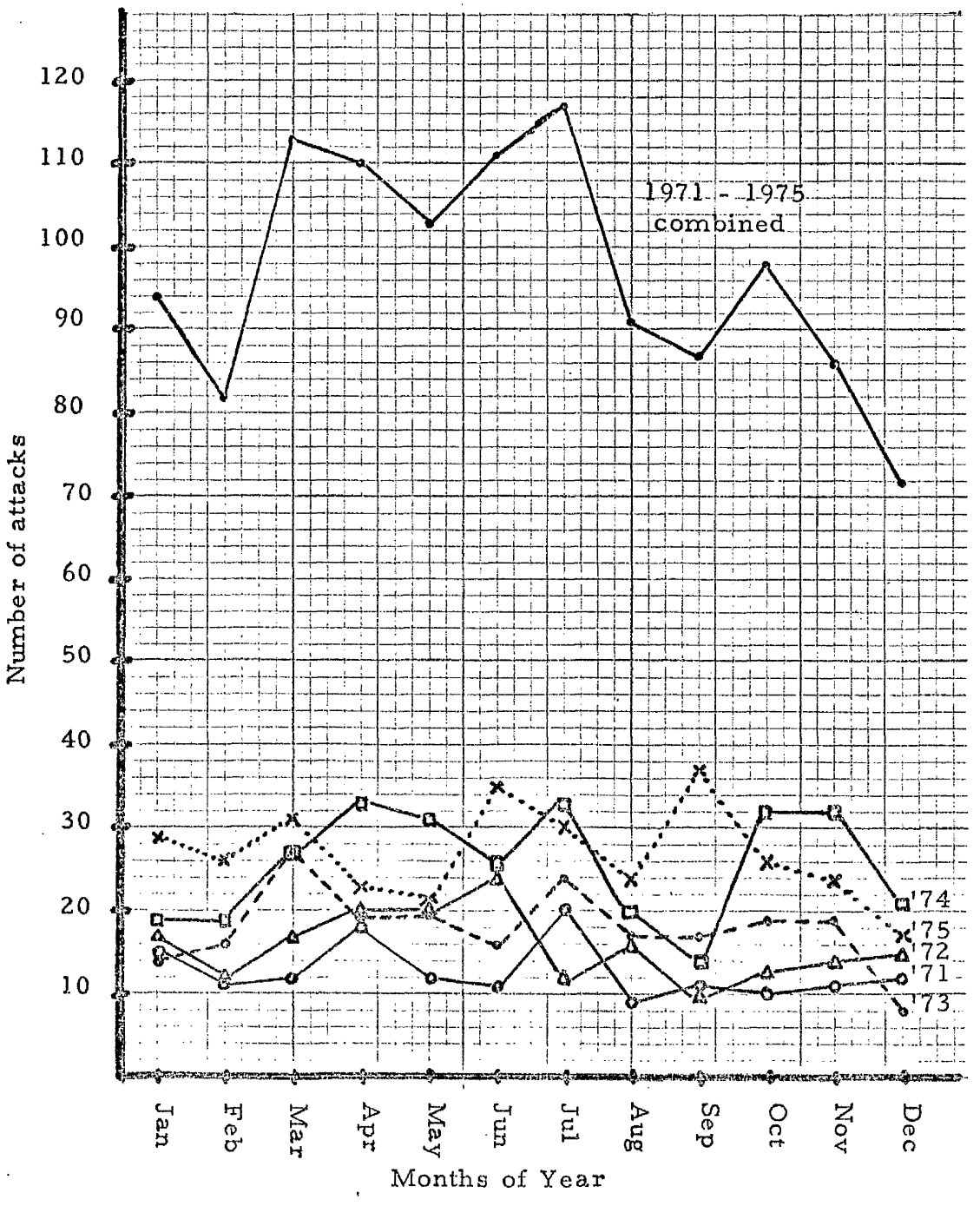
The Frequency and Seasonality of Acute Attacks

In 442 of the 604 patients complete data were obtained on the number of acute attacks experienced and the therapy received by each patient. In 59% of these cases no therapy had been given which is known to influence the frequency of the acute attack and this group had experienced a total of 497 acute episodes in a period of 546 patient years, giving an average of 0.91 acute attacks per patient year.

The number of attacks each month for all 604 patients during each of the years 1971 to 1975 and for all 5 years combined, is shown in Figure I. From this it appears that the number of attacks increases in early Spring and falls in the late Summer. Analysis of the data for the 5 years combined showed there to be significantly more attacks in the 6 months, March to August, than in the other 6 months of the year (X_1^2 = 9.0 : 1.0% level) and the graph suggests a seasonal variation. However, when the data were examined by the more rigorous technique of regression analysis and the use of a seasonal adjustment statistical routine, no evidence could be found to support this suggested seasonality nor to support an association of frequency of attack with environmental humidity, temperature or pressure. The seasonal adjustment routine is a statistical method carried out by a computer programme and which is capable of showing how the variations in attack frequency can be ascribed to a general trend, the seasonal factors, and irregular changes due to random statistical variations and any other changes not explained by a trend or seasonality. For analysis of these 3 measurements in relation to the occurrence of acute attacks, Great Britain was divided into 3 areas: (a) Scotland, (b) the North and Midlands of England plus Wales, and (c) the South of England, and their weather measurements were collected from (a) Abbotsinch, (b) Birmingham, and (c) Heathrow

FIGURE 1.

THE FREQUENCY OF ACUTE ATTACKS OF GOUTY ARTHRITIS DURING EACH MONTH OF EACH YEAR, 1971 - 1975, AND FOR THE YEARS COMBINED.



respectively, for the years 1971 to 1975, and are presented in Appendix VII.

Joints Involved

The frequency of involvement of the different joints in the first attack and for all attacks combined is shown in Table 15. With the passage of time many people experienced involvement of joints other than that involved in the first attack. For both the first attack and for all attacks combined, the metatarsophalangeal joint of the great toe was predominantly involved. The frequency with which joints other than those specifically listed in Table 15 became involved also increased. A large number of joints are included in this grouping: the small intercarpal joints of the hand, the shoulder, the sterno-clavicular, hip, spine and tempero mandibular joint. Of course, whether all such joints were truly gouty or were labelled so, since the arthropathy had arisen in a gout diagnosed patient, is uncertain. During the course of the disease, more than 1 joint was involved in 244 (40.4%) of cases. Simultaneous involvement of more than 1 joint occurred in 36 (5.8%) cases during the first attack of acute gouty arthritis and in 69 (11.4%) of the patients during subsequent attacks. Of the total 604 cases from whom the information was sought, 1% experienced simultaneous involvement of more than 1 joint on more than one occasion. The most frequent combinations of simultaneous joint involvement were:

1. metatarsophalengeal joint of the great toe plus the ankle joint or a small joint of the foot.
2. metatarsophalangeal joint of the great toe plus the knee joint.

TABLE 15

ANALYSIS OF JOINT INVOLVEMENT IN SURVEY GOUT PATIENTS

Joints	Joints involved in 1st attack (% of 600)	Joints involved in all attacks (% of 604)
Great toe	356 (59.3)	421 (69.7)
Ankle/foot	106 (17.6)	207 (34.3)
Knee	42 (7.0)	120 (19.9)
Finger	33 (5.5)	70 (11.6)
Wrist	22 (3.6)	44 (7.3)
Elbow	9 (1.5)	43 (7.1)
Other joints	52 (8.7)	100 (16.6)
Extra articular	16 (2.7)	22 (3.6)

3. the ankle or a small joint of the foot plus the knee.

In addition, a finger joint was not infrequently involved with a lower limb joint.

Tophi

Of the 604 patients 23 had subcutaneous tophi at the time of diagnosis, 472 had no evidence of tophi at that time, while in 107 cases tophi had not been sought and in 2 the data were missing. In 10 of the 23 cases with tophi, the observation had been made prior to the first attack of acute gouty arthritis. As a group the 23 had a higher percentage than the others with:

1. a family history.
2. multiple joint involvement (including simultaneous involvement).
3. obesity.
4. vascular disease including hypertension, and
5. a younger age of onset.

Thus, their profile was consistent with a more severe pathology.

Precipitating Factors

Four hundred and eighty four of the 604 satisfactorily answered the question relating to precipitating factors. Three hundred and fifty-eight (74%) denied all knowledge of a precipitating factor. Of the remaining 126 (26%), 53 (11%) said alcohol, 29 (6%) certain foods, 19 (4%) strenuous exercise, 10 (2%) psychological trauma, 5 (1%) physical trauma including surgery, 5 (1%) climatic change (drop in temperature, rise in humidity) and the remaining 5 (1%) was made up of infections and in one case severe attacks of psoriasis.

Social Class

The social class profile of 947 patients in whom information was provided is compared with the national data[34] in Table 16. The sample shows a highly significant association between gout and the higher social classes, assuming there is no tendency for the unclassifieds to be in particular classes. Variation over the 5 classes was tested as was the difference between the upper 2 classes and the lower 3; the unclassifieds being ignored in each case. By the Chi-squared test both were found significant at the 0.1% level (variation over the 5, $X_4^2 = 154.3$: upper 2/lower 3, $X_1^2 = 136.4$).

Personality

The 7 point scale assessment showed that the doctors considered 63% of the 575 gout patients to be within normal limits (squares 3, 4, 5), 19% to be introverted (squares 1 or 2) and 18% to be extroverted (squares 6 or 7).

Alcohol Consumption

Four hundred and eighty of the 604 patients answered all 4 questions relating to the pattern of alcohol intake. Prior to being diagnosed as a gout sufferer 84% admitted to drinking alcohol and 80% still did, although 35% had reduced their consumption, 19% having been advised by their doctor to do so.

Secondary Gout

The diagnosis was believed to be secondary gout in 105 (10.0%) of 1050 cases where the information was provided. In the remaining

TABLE 16

SOCIAL CLASS - PROFILE OF 947 GOUT PATIENTS

Survey data	Social Class					
	1	2	3	4	5	Unclassified
947 patients (100%)	4.0	25.8	33.3	8.0	4.9	24
1971 Census for Gt. Britain (100%)	3.1	15.7	43.7	18.5	7.3	11.7

90%, the doctor considered the diagnosis to be primary gout in 82.4% and was uncertain, for a variety of reasons, in 7.6% of cases. Nevertheless, in the latter 7.6% there was no convincing evidence to support a diagnosis of secondary gout. Of the 105 cases deemed to be secondary gout, diuretics were incriminated in 93 cases, and the remaining 12 cases consisted of 3 with polycythaemia rubra vera, 4 with leukaemia, 1 with haemolytic anaemia, 1 with congenital heart disease, 1 with renal failure and 2 with psoriasis. With increasing age, the percentage of cases believed to be secondary gout increased, being 3% of those diagnosed in the 15 - 44 year age group, 7% of those diagnosed in the 45 - 64 year age group and 15% of those over 64 years.

Associated Chronic Conditions

Table 17 lists the frequency with which 604 gout patients had in addition one of the listed chronic diseases. It can be seen that in more than half of these cases the disease was diagnosed before the diagnosis of gout was made. Taking each of the listed associated conditions in turn, the proportion having that disease was calculated for each of the weight bands (20+% underweight, 10 - 20% underweight, 1 - 10% underweight, no difference - that is, ideal weight, 1 - 10% overweight, 10 - 20% overweight, 20+% overweight). The patients were placed in these weight bands by assessing their actual weight against that predicted in the actuarial tables of weight.[33] By reference to graphs of the data it was evident that there was no increasing or decreasing tendency. A comparison of those overweight with those underweight or having their expected weight, showed no significant difference for any of the diseases except congestive cardiac failure which showed a significant association with underweight ($X_1^2 = 9.9$: 1.0% level). The frequency with which patients had one or more of

TABLE 17

ASSOCIATED CHRONIC CONDITIONS IN PATIENTS WITH GOUT

Diagnosis	604 patients		598 patients	
	No. with disease (% of 604)	% with pregout diagnosis	Hospital referred re gout (% of 122)	Not hospital referred (% of 476)
Cerebro-vascular	45 (7.4)	60.0	5.7	7.9
Angina pectoris	85 (14.1)	51.8	21.3	12.2
Myocardial infarction	51 (8.4)	54.9	13.9	7.1
Congestive cardiac failure	80 (13.2)	62.5	6.6	14.9
Peripheral vascular disease	40 (6.6)	52.5	8.2	6.2
Hypertension	168 (27.8)	67.3	31.1	27.0
Diabetes mellitus	13 (2.2)	61.5	0.8	2.5
Hypothyroid-ism	7 (1.2)	85.7	1.6	1.0
Renal paren-chymal	13 (2.2)	53.8	5.7	1.2
Renal stones	37 (6.1)	59.5	11.5	4.8

the listed associated diseases is seen in Table 18.

Among the many other recorded associated chronic diseases were alcoholic hepatitis/cirrhosis in 2%, chronic bronchitis in 3%, osteoarthritis in 2%, inguinal and hiatus hernia in 3% and myxoedema in 1% of cases.

Renal Parenchymal Damage and Renal Stones

Since hyperuricaemia is an established cause of renal calculi and the gouty kidney has featured regularly in the literature of gout, a closer look has been taken at the patients with these 2 conditions. Of the 604 cases, 45 had renal pathology: 37 (6.1%) had renal calculi and 13 (2.2%) were diagnosed as having renal parenchymal damage. Five had both.

Renal Calculi

A comparison of the 37 renal calculi patients with the 567 exhibiting no evidence of renal calculi showed the 2 groups to be very similar in most parameters, such as age, sex, weight and known family history of gout. A difference was noted in the results of the doctors' ranking of the patients on a 7-point scale for personality assessment. For the gout patients with stones there were 5 extroverts, 16 normals and 12 introverts (total 33), and for the gout patients with no stones the numbers were 104, 362 and 109 (total 542). No significant difference was noted between the extrovert and normal groups. These were then combined and when compared with the introvert groups a statistically significant correlation was noted between introvert personality and renal stones ($X_1^2 = 5.0$: 5.0% level).

TABLE 18

THE FREQUENCY OF SIMULTANEOUS OCCURRENCE OF ASSOCIATED CHRONIC CONDITIONS IN PATIENTS WITH GOUT.

Associated Diseases	Number of Patients (% of 604)
None	309 (51.2)
1	146 (24.2)
2	87 (14.4)
3	37 (6.1)
4 or more	23 (3.8)

Another difference was shown with respect to the time lag from clinical onset of gout to its diagnosis. Twenty-two (59.5%) of the 37 stone patients were diagnosed within 2 years, compared with 470 (90.4%) of the 520 non-stone patients for whom the time lag information was available. This difference was significant at the 0.1% level ($X_1^2 = 32.02$). This finding is interesting, since in 22 of the 37 renal calculi patients, this condition preceded the appearance of clinical gouty arthritis.

The renal stone group were found to have a significantly higher association with angina pectoris, there being 11 of 37 afflicted compared with 74 of the 567 non-stone group ($X_1^2 = 6.7$: 1.0% level). Likewise there was a significant association with the following associated conditions; myocardial infarction (10 of the stone group compared with 41 in the non-stone group - $X_1^2 = 15.1$: 0.1% level), renal damage (5 compared with 8 - $X_1^2 = 18.8$: 0.1% level), hypertension (18 compared with 150 - $X_1^2 = 7.5$: 1.0% level) and diabetes mellitus (4 compared with 9 - $X_1^2 = 10.0$: 1.0% level). When all the chronic associated conditions listed in Table 17 were taken together, 26 of the 37 renal stone cases and 258 of the 567 non-stone cases had at least one additional chronic condition. Statistical analysis showed the renal stone group to have a greater association ($X_1^2 = 7.6$: 1.0% level).

There was no significant difference in the current gout therapy of the 2 groups, although a higher percentage of the renal stone patients (62.1% of 37 patients) were on long-term therapy than the non-stone patients (43.6% of 564 patients). Equally the difference in the hospital diagnosis rate, being 13.5% in the stone group and 7.4% in the non-stone group, did not reach statistical significance.

Renal Parenchymal Disease

Thirteen cases had renal parenchymal damage with the diagnoses preceding that of gout in 7 of the cases. In 2 cases the gout was believed to be secondary to diuretic therapy and none of the 13 was considered to have resulted from the renal impairment. Three of the cases were women. In the 2 cases considered to be secondary to diuretic therapy the diagnosis of renal parenchymal damage followed that of gout and was associated with renal calculi, hypertension and in one of the cases with diabetes mellitus. The age of onset of gout in these 2 cases was 43 years and 48 years. In the remaining 11 cases the age of onset ranged from 24 to 61 years with a mean of 43 years and while 2 of the cases had no other known chronic disease than gout followed by the appearance of renal parenchymal damage, 4 cases had, in addition, renal calculi, 7 had hypertension and 1 had diabetes mellitus. Two of the 13 had evidence of cerebrovascular disease, 3 of angina pectoris, 1 had had a myocardial infarction with subsequent congestive cardiac failure, 2 had peripheral vascular insufficiency and 2 had hypothyroidism.

A Comparison of Patients Referred With Those Not Referred to Hospital

Of the 604 patients on whom detailed data were collected, information was available on hospital referral in 598 cases. Of these 122 (20.4%) had been diagnosed in hospital and/or referred to hospital for consultation. Data on the referral rate to hospital by age of onset of gout was available in 557 patients, showed that the referral rate varied markedly with age. Amongst the 9 whose

age of onset of gout was between 15 - 24 years it was 88.9% and thereafter it dropped, being 27.1% of the 151 aged between 25 - 44 years, 19.7% of the 248 whose onset of gout was 45 - 64 years and only 11.4% of the 149 patients where the onset occurred on or after 65 years of age. Therefore, it would appear that the older one is at the onset of clinical gout, the less likelihood there is of being referred to hospital (X_1^2 = 22.3 : 0.1% level). A straight comparison of those over 45 years with those under 45 years again showed that significantly more in the under 45 year group were referred to hospital (X_1^2 = 11.8 : 0.1% level). Of the 496 males, 105 (21.2%) were seen at hospital at some point, while only 17 (16.7%) of the 102 females were referred.

Interesting differences were noted in the frequency of joint involvement. Examination of the results relating to the first attack, by hospital referral at some point, shows 297 (62.4%) of the 476 patients not referred to have a classic great toe presentation, while in the 122 referred patients this occurred in only 59 (48.4%). This difference is statistically significant (X_1^2 = 6.5 : 5.0% level). Statistical analysis of the results in Table 19 by the Chi-squared test again shows, at the 5% level (X_1^2 = 4.4),that those with great toe involvement are less likely to be referred to hospital than the rest. For the other joints the reverse is true with the results being significant at the following levels: ankle and foot (X_1^2 = 11.2 : 0.1% level), knee (X_1^2 = 23.9 : 0.1% level), finger (X_1^2 = 10.8 : 1.0% level), wrist (X_1^2 = 11.3 : 0.1% level), elbow (X_1^2 = 7.2 : 1.0% level), others (X_1^2 = 55.4 : 0.1% level). No significant difference was demonstrated for the extra-articular results. Simultaneous involvement of more than 1 joint occurred twice as often in the hospital referred group as

TABLE 19

TOTAL JOINTS INVOLVED IN GOUT PATIENTS REFERRED AND NOT REFERRED TO HOSPITAL

Joint	Referred to hospital (% of 122)	Not referred to hospital (% of 476)
Great toe	75 (61.5)	346 (71.8)
Ankle and foot	58 (47.5)	149 (30.9)
Knee	44 (36.1)	76 (15.8)
Finger	25 (20.5)	45 (9.3)
Wrist	18 (14.8)	26 (5.4)
Elbow	16 (13.1)	27 (5.6)
Others	48 (39.3)	52 (10.8)
Extra articular	8 (6.6)	14 (2.9)

in those not referred.

A significantly greater probability of being referred to hospital was noted among patients with angina pectoris (X_1^2 = 5.6 : 5.0% level), myocardial infarction (X_1^2 = 4.9 : 5.0% level) and hypertension (X_1^2 = 7.2 : 1.0% level). For cerebrovascular and peripheral vascular diseases, as well as those with none of the associated diseases, the differences were not significant; in congestive cardiac failure cases the probability of being referred to hospital for gout was less (X_1^2 = 5.4 : 5.0% level) and the numbers in diabetes mellitus, hypothyroidism and renal parenchymal damage were too small for realistic testing. A breakdown of the 122 referred and the 476 not referred to hospital has been included in Table 17. While superficially the frequency of referral to hospital for gout clearly rose with the increase in the number of associated chronic problems that the patient had, from 15.8% with one associated condition to 31.8% in those with four, this association was not found to be statistically significant.

Therapy

Assessment of therapy in 601 cases showed 269 (44.8%) to be receiving continuous therapy with either allopurinol (228 cases - 37.9%) or a uricosuric drug as in 41 cases (6.8%) and a further 19 (3.2%) cases were receiving one of these drugs intermittently. An additional 24 patients (4.0%) were receiving continuous and 61 patients (10.1%) intermittent therapy with a drug primarily for the treatment of the acute attack and which would not influence the prognosis of the disease. As treatment of the acute attack 434 (72.2%) of the cases received phenylbutazone, 115 (19.1%)

indomethacin and the rest received predominantly colchicine, although the occasional case was given aspirin. Of those given colchicine, 35.7% failed to show the classic rapid response.

AN ATTITUDINAL SURVEY OF GENERAL PRACTITIONERS TO THE DIAGNOSIS OF GOUT

As at the end of 1975 the period of time since graduation varied between 1 and 58 years (mean 19.9 years) and the participating practitioners had been members of their present practices for less than 1 year to 41 years (mean 13.2 years).

Response to questions by 160 general practitioners (100%)

1. During the course of your practice do you request serum uric acid (SUA) estimations? 160 replies were received.
   159 (99.4%) replied Yes 1 (0.6%) replied No

2. Do you consider that the results of this laboratory test can be relied upon to give, consistently, a true reflection of the level of uric acid in your patients' serum? 158 replies were received.
   120 (75.9%) replied Yes 38 (24.1%) replied No

3. (a) Would you repeat the SUA test if the result was inconsistent with what you anticipated and
   (i) the result was normal? 157 replies were received.
   97 (61.8%) replied Yes 60 (38.2%) replied No
   (ii) the result was above normal? 157 replies were received
   88 (56.1%) replied Yes 69 (43.9%) replied No

   (b) Would you repeat the SUA test if the result was consistent with what you anticipated and
   (i) the result was normal? 157 replies were received
   14 (8.9%) replied Yes 143 (91.1%) replied No
   (ii) the result was above normal? 157 replies were received

47 (29.9%) replied Yes 110 (70.1%) replied No

The 14 doctors who answered Yes to Questions 3 (b) (i), as a routine, repeated all serum urate estimations for confirmation of the result.

Further analysis of the 120 who considered the laboratory test to be dependable and of the 38 who did not (Question 2), showed 82 (68.3%) of the former group and 35 (92.1%) of the latter group to repeat the test. These results are consistent with an association between believing the test to be reliable and not repeating it (1% level).

From the questionnaire replies it was found that 37 doctors never repeated the serum urate test for confirmation, while 122 did do so on at least some occasions. Of the 37, 35 (94.6%) believed the urate test to be reliable and 86 (70.5%) of the 122 were of a similar belief. Thus, again there is a significant association between believing the test to be reliable and not repeating it (1% level).

To assess if there was an association between repetition of the serum urate test and the result being inconsistent with that expected, the results for normal and raised serum urates were considered separately. Of the 97 doctors (Question 3a) who stated that they would repeat a normal result when it was inconsistent with the result anticipated, 83 did so only under those circumstances; whereas only 2 of the 14 doctors (Question 3b) who said they would repeat the test when the serum urate was normal and consistent with expectation, did so exclusively under those circumstances. When the same examination was undertaken for the cases when the serum urate was raised, while 51 of the 88 (Question 3a) repeated the test solely when raised and inconsistent, only 9 of the 47 (Question 3b) exclusively repeated a

raised result when it was consistent with that anticipated. Both for the normal and raised cases there was a significant association at the 0.1% level between repetition of the test and the result being inconsistent with that anticipated.

4. (a) In patients who have a known raised SUA, do you repeat periodically their SUA test if they are on long-term treatment with a drug which reduces the serum uric acid? 160 replies were received.

   134 (83.8%) replied Yes 26 (16.2%) replied No

   (b) In patients who have a known raised SUA, do you repeat periodically their SUA test if they are not on long-term treatment with a drug which reduces the serum uric acid? 149 replies were received.

   92 (61.7%) replied Yes 57 (38.3%) replied No

A breakdown analysis of the above data showed that 3 of the 92 doctors answering "Yes" to Question 4b said they would do a follow-up test if the patient was not on therapy, but not if he was on therapy; whereas 37 of the 134 answering "Yes" to Question 4a would do it only if the patient was on therapy. So there is an association significant at the 0.1% level, of follow-up testing with the patient being on therapy.

5. (a) If you could have access to a method of estimation of serum uric acid on one drop of blood from a finger prick (similar to Dextrostix), would this be of value in your practice? 160 replies were received.

   121 (75.6%) replied Yes 39 (24.4%) replied No

(b) If you could have access to a method of estimation of the serum uric acid on one drop of blood from a finger prick (similar to Dextrostix) would it increase your utilisation of the SUA test in the routine assessment of your patients with conditions affecting their joints? 158 replies were received.

95 (60.1%) replied Yes 63 (39.9%) replied No

Of the 95 doctors who believed that a spot test would increase their utilisation of the serum urate estimation, 28 (29.5%) were dissatisfied with the consistent reliability of the results of the laboratory estimation. Of the 63 doctors who felt that it would not increase their utilisation of the serum urate test, 9 (14.3%) thought the laboratory results to be unsatisfactory for consistent reliability. An association between those dissatisfied with the current testing and those who thought a spot test would increase their frequency of serum urate testing was found (significant at the 5% level).

6. (a) Do you think that if a patient has gouty arthritis he will run a greater risk of developing other conditions? 157 replies were received.

128 (81.5%) replied Yes 29 (18.5%) replied No

(b) Do you think that gout is associated with an increased mortality? 156 replies were received.

93 (59.6%) replied Yes 63 (40.4%) replied No

The frequency of long-term follow-up of the levels in patients with known hyperuricaemia, whether on therapy or not, did not vary between those doctors who felt that gout was associated with an increased risk of developing other conditions and/or mortality and

those who did not.

7. (a) In making the diagnosis of gout, which of the listed factors do you normally look for?

For 156 of the 159 doctors (98.1%) the presence of a painful swollen joint was essential to the diagnosis and 150 (94.3%) required an appropriate clinical history. One or both of these was required by all 159 doctors. The frequency of use of additional factors is listed in Column 1 of Table 20.

(b) Assess each of the listed factors in turn and state which, by its sole absence, in your opinion, would exclude the diagnosis of gout.

The second Column of Table 20 shows for each of these factors how many doctors felt that its sole absence would exclude the diagnosis of gout.

(c) Assuming that all the listed factors or tests are freely available to you to assist you in coming to a diagnosis of gout, which do you consider of value and therefore would use?

The third Column of Table 20 shows the weight of importance placed on each of the factors for diagnostic purposes by this group of doctors. If more freely available more of the doctors said they would use X-ray and synovial fluid examination more than they do presently. In both cases this was significant at the 0.1% level. Equally significant (0.1% level) was the stated reduction in use the doctors would make of family history, tophi and phenylbutazone as a therapeutic test.

(d) Which factor or factors would you accept as the absolute minimum to establish the diagnosis of gout?

Fully documented replies were received from 158 (98.8%) of the

TABLE 20

FACTORS USED BY THE GENERAL PRACTITIONERS IN MAKING THE DIAGNOSIS OF GOUT

(All % based on a total of 159 doctors)

Factors	Normal Routine No.	(%)	Exclusion Factors No.	(%)	Factors of Value No.	(%)
Family History	117	(73.6)	0	(0.0)	66	(41.5)
Dietary History	46	(28.9)	0	(0.0)	33	(20.8)
Tophi	132	(83.0)	2	(1.3)	72	(45.3)
Raised S. U. A.	151	(95.0)	88	(55.3)	148	(93.1)
Synovial Fluid examination	25	(15.7)	19	(11.9)	71	(44.7)
X-rays	49	(30.8)	3	(1.9)	94	(59.1)
Response to colchicine	41	(25.8)	16	(10.1)	41	(25.8)
Response to phenyl-but. /indometh.	103	(64.8)	9	(5.7)	63	(39.6)
Other Factors	10	(6.3)	2	(1.3)	11	(6.9)

doctors. In addition to a typical, painful, swollen joint or a satisfactory clinical history of such an episode, 130 (82.3%) stated the need for a raised serum urate. Instead of, or in addition to a raised serum urate, 8 doctors (5.1%) stated the need for a positive X-ray finding, 17 (10.8%) for a positive colchicine therapeutic test and 29 (18.4%) for a positive therapeutic response to phenylbutazone or indomethacin.

CHAPTER THREE

RESULTS OF THE STUDY OF THE SERUM URATE PROFILE IN SUBJECTS WITHOUT GOUT

LABORATORY CONTROLS

The Urica-quant Method[28]

Two different batches of Precilip were utilised and the results, covering the 10 days on which the control procedures were done, are as shown below:

Precilip batch number 320 used on 3 different days.
Mean Serum Urate 174 μmol/litre (2.93 mg/100 ml)
Standard Deviation 2.79 μmol/litre (0.047 mg/100 ml)
Coefficient of Variation 1.607%
Confidence Limits (95%) 166 - 183 μmol/litre (2.79 - 3.08 mg/100 ml)

Precilip batch number 326 used on 7 different days.
Mean Serum Urate 159 μmol/litre (2.67 mg/100 ml)
Standard Deviation 8.98 μmol/litre (0.151 mg/100 ml)
Coefficient of Variation 5.65%
Confidence Limits (95%) 150 - 168 μmol/litre (2.52 - 2.82 mg/100 ml)

The Uricase Method of Praetorius and Poulson[29]

Precilip batch number 444 used on 34 different days.
Mean Serum Urate 240 μmol/litre (4.05 mg/100 ml)
Standard Deviation 9.1 μmol/litre (0.153 mg/100 ml)
Coefficient of Variation 3.79%
Confidence Limits (95%) 237 - 244 μmol/litre (3.99 - 4.10 mg/100 ml)

The Serum Urea Nitrogen by the Method of Marsh et al.[32]

Wellcomtrol used on 54 different days.

Mean Serum Urea 8.36 mmol/litre (23.49 mg/100 ml serum urea nitrogen)

Standard Deviation 0.17 mmol/litre (0.486 mg/100 ml)

Coefficient of Variation 2.10%

Confidence Limits (95%) 8.31 - 8.41 mmol/litre (23.35 - 23.62 mg/100 ml)

THE VALIDATION STUDY OF THE POSTAL METHOD OF COLLECTION

The results of the mean serum urate of 34 samples tested at varying intervals after sampling are given in Table 21. There was a decline in the measured urate with time, but the fall did not reach significance at the 5.0% level, when compared with the 2 hour result, until day 5. Therefore, samples arriving by post up to 3 days after being taken were included in the study and any sample more than 3 days old was excluded. There was no difference in the average postal time from the various regions of Great Britain.

MEASUREMENTS INCLUDING THE SERUM URATE LEVELS IN SUBJECTS WITHOUT GOUT

Practice and Patient Selection of Subjects without Gout

Samples were collected from 53 practices as specified under methods in Chapter Two. There were 7 practices in Scotland, 5 in Wales and 41 in England, covering all the regions. While they were

TABLE 21

SERUM URATE IN 34 SAMPLES ANALYSED AT VARIOUS INTERVALS

Time after sampling (in hours)	Mean serum urate (μmol / litre)	Standard error of the mean	Significance
2	309	13	Not Significant
24	292	12	Not Significant
48	281	11	Not Significant
72	278	11	Not Significant
120	267	11	5.0% level

selected to cover urban and rural communities, as well as regions of more and less affluence, the same degree of matching, as in the Gout Study, was not felt necessary since the attitudes or beliefs of the doctors would not influence the patients' level of serum urate.

Samples were collected from 3148 patients which was 32 samples short of the anticipated 3180, since 11 practices sent in between one and 6 samples short of the 60 promised. Of this 3148 samples, 262 were discarded. In the majority of cases this was due to the sample arriving after 3 days, while the rest were either broken in the post or badly haemolysed on arrival. Thus 2886 samples were analysed biochemically, comprising 1153 men and 1112 women in England, 164 men and 226 women in Scotland and 104 men and 127 women in Wales.

The Frequency Distribution of Serum Urate.

The distribution of serum urate is given in Figure 2. The curves approximate to a normal distribution with a slight preponderance of higher values.

A Comparison of Males and Females within England, Wales, and Scotland for Mean Serum Urate and other Parameters.

The data from these 2886 patient samples have been divided by sex and by country and are presented in Table 22. There was no significant difference in any of the parameters measured between the males of England, Wales and Scotland. Similarly the female populations of the three countries were not significantly different from each other. As would be expected, the males were taller

Figure 2. THE SERUM URATE PROFILE (in μmols per litre)

Percentage males (a) and females (b) with different serum urate levels in England, Wales and Scotland.

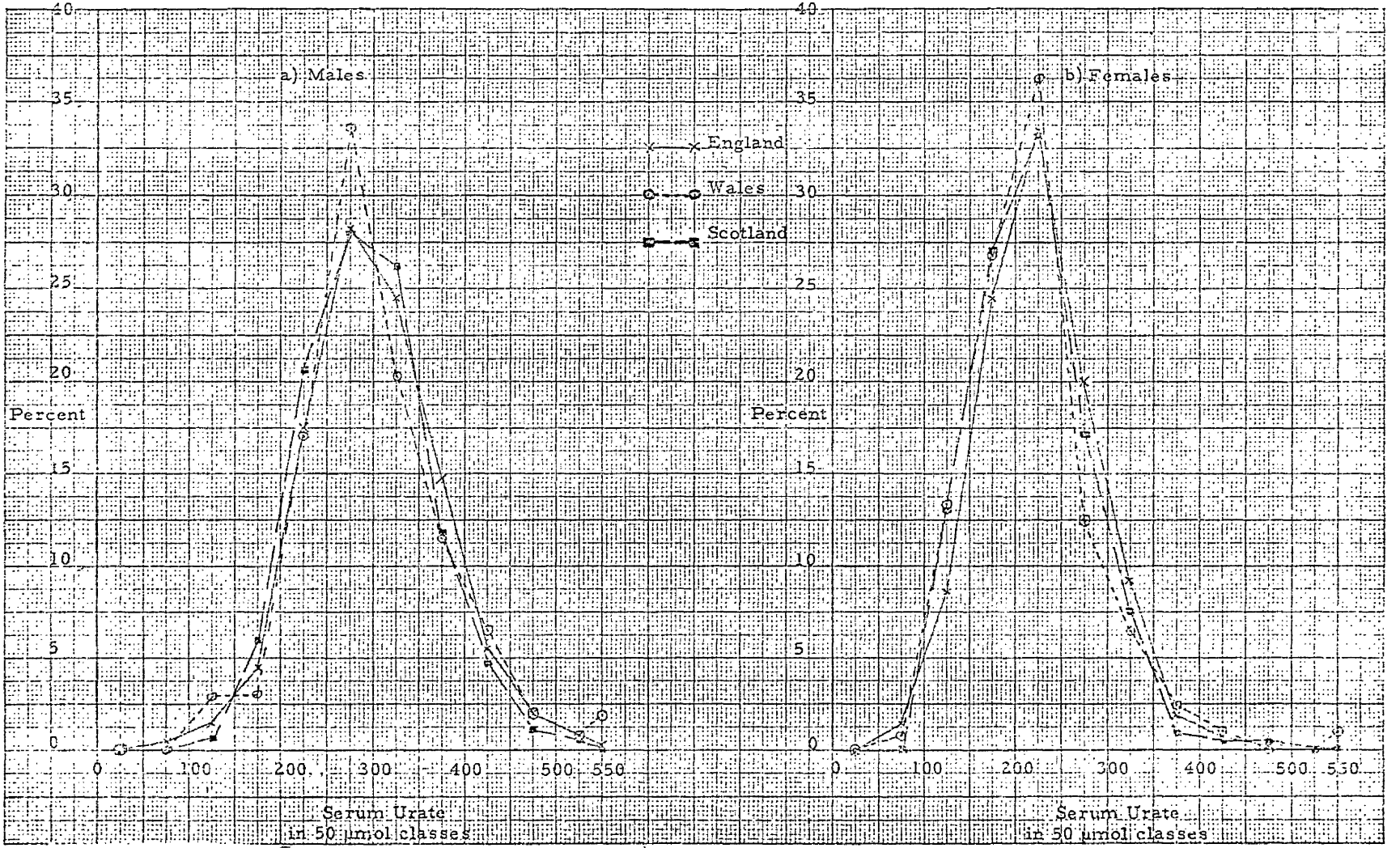


TABLE 22

A COMPARISON OF NON-GOUT MALES AND FEMALES WITHIN ENGLAND, WALES AND SCOTLAND

	MEN			WOMEN		
	England	Wales	Scotland	England	Wales	Scotland
No. of subjects	1153	104	164	1112	127	226
Serum urate (μmol/litre) ± SD	303 ± 73	303 ± 81	292 ± 66	226 ± 64	220 ± 67	220 ± 61
Age in years ± SD	44.5 ± 17.1	45.3 ± 16.9	45.4 ± 17.1	44.2 ± 17.7	43.8 ± 18.4	43.4 ± 17.3
Height in cms ± SD	173.8 ± 8.0	171.5 ± 7.2	173.2 ± 7.3	161.7 ± 7.1	163.2 ± 6.0	159.7 ± 6.5
Weight in Kg ± SD	73.1 ± 11.4	70.3 ± 10.1	72.4 ± 11.7	61.6 ± 11.4	61.9 ± 10.7	61.4 ± 11.8
Serum urea (mmol/litre) ± SD	5.6 ± 3.31	5.1 ± 1.28	5.7 ± 5.48	5.1 ± 2.39	5.2 ± 1.39	5.0 ± 1.60
Mean arterial blood pressure mm. Hg ± SD	97.6 ± 14.1	93.5 ± 11.6	98.6 ± 11.9	96.0 ± 15.4	94.1 ± 13.2	96.1 ± 14.9

Abbreviation SD = Standard Deviation

(combined mean for all regions 173.5 cms) than the women (combined mean 161.5 cms), they were heavier (combined means 72.8 kg and 61.6 kg respectively) and also they had higher blood ureas (combined means 5.59 mmol/litre and 5.09 mmol/litre respectively). All 3 results were found to be significant at the 0.1% level.

Regression Analysis

A stepwise regression was carried out to find how serum urate varied with sex, weight, blood urea, lean body mass,[35] age, and Ponderal Index, and the results are shown in Table 23. Twenty seven percent variance could be explained by these factors, 22% being explained by sex alone. The variables were entered in the regression in the following order: sex, weight, urea, age, lean body mass, Ponderal Index, each having an effect significant at the 5.0% level. When females alone were considered, 11% of the variance could be explained by the various factors mentioned in the previous sentence, each at the 5.0% level. For males, only 5% of the variance could be explained by weight (4.5%) and age (0.5%) and here again each was significant at the 5.0% level, with the correlation being a negative one in the case of age.

Hyperuricaemia

Hyperuricaemia has been defined in the study as a value of serum urate 420 μmol per litre or greater, rather than taking values of two standard deviations above the mean. The reason for choosing this value is based upon known data concerning the solubility of sodium urate. Aqueous solutions having the sodium content of plasma are saturated at between 380 and 405 μmol per litre at 37°C.[36] The

TABLE 23

STEPWISE REGRESSION OF SERUM URATE WITH SEX, AGE, UREA, WEIGHT, PONDERAL INDEX AND LEAN BODY MASS

BOTH SEXES			MALES			FEMALES		
Variable Added	R^2	R	Variable Added	R^2	R	Variable Added	R^2	R
Sex	0.224	0.473	Weight	0.045	0.212	Age	0.048	0.218
Weight	0.260	0.510	Age	0.049	0.221	Weight	0.085	0.292
Serum urea	0.267	0.517	Serum urea*	0.051	0.225	Serum urea	0.106	0.325
Age	0.268	0.518	Lean Body Mass*	0.051	0.226	Lean Body Mass	0.108	0.328
Lean Body Mass	0.269	0.519	Ponderal Index*	0.051	0.227	Ponderal Index	0.113	0.336
Ponderal Index	0.270	0.520						

Note: * = Not significant

R = Correlation coefficient

solubility of sodium urate in plasma will be slightly higher due to the presence of urate binding proteins, but it is generally accepted that a true serum urate value of greater than 420 μmol per litre is abnormal.[37] Using this figure of 420 μmol per litre, the overall incidence of hyperuricaemia in the study was 3.5% with 6.0% in males and 1.0% in females. Analysing the results by region gave the incidence in males in England as 5.7%, Wales 9.6% and Scotland 5.5%, and in females in England as 1.0%, Wales 1.6% and Scotland 0.9%. There was no significant difference in the regional incidence of hyperuricaemia (Chi-squared test with Yates correction).

A comparison of the various parameters measured in the 85 hyperuricaemic men compared with the normouricaemic male population is given in Table 24. The hyperuricaemic men are significantly heavier than the normouricaemic men, but are of a similar age and height.

Social Class and Serum Urate

The results sub-divided into England, Wales and Scotland, are presented in Table 25. The serum urate values for females showed no significant trend with social class. The males, however, showed a fall in serum urate with decreasing social class. In England a comparison of Social Classes I and IV demonstrated a fall which was significant at the 5.0% level, and in Scotland a comparison of Social Classes II and V also showed a fall which, in this case, was found to be significant at the 1.0% level.

TABLE 24

TABLE COMPARING RESULTS IN HYPERURICAEMIC AGAINST NORMOURICAEMIC MALES (HYPERURICAEMIC DEFINED AS GREATER THAN 420 µmol PER LITRE)

		Normouricaemic population (1336 males)	Hyperurica emic population (85 males)	Significance
Serum urate (µmol per litre)	mean SD	289 61	461 42	0.1% level
Age (years)	mean SD	44.5 17.25	44.0 15.54	Not Significant
Height (cms)	mean SD	170.8 22.95	171.7 21.10	Not Significant
Weight (Kgs)	mean SD	71.4 13.81	77.4 15.61	0.1% level
Serum Urea (mmol/litre)	mean SD	5.6 3.65	5.6 1.51	Not Significant
Systole BP (mm.Hg.)	mean SD	122.9 38.43	123.4 44.22	Not Significant
Diastole BP (mm.Hg.)	mean SD	74.6 25.86	76.6 27.51	Not Significant

Abbreviation SD = Standard Deviation

TABLE 25

MEAN SERUM URATE AND STANDARD DEVIATIONS FOR EACH SOCIAL CLASS IN ENGLAND, WALES AND SCOTLAND

	Class	I	II	III	IV	V
Males	England	316 ± 51 (65)	305 ± 73 (177)	301 ± 74 (519)	292 ± 77 (73)	304 ± 71 (78)
	Wales	327 ± 14 (3)	328 ± 83 (7)	309 ± 80 (53)	292 ± 58 (8)	299 ± 63 (9)
	Scotland	327 ± 11 (5)	322 ± 51 (16)	288 ± 64 (94)	280 ± 58 (23)	265 ± 36 (9)
Females	England	225 ± 58 (39)	223 ± 68 (165)	223 ± 61 (440)	222 ± 59 (74)	235 ± 56 (57)
	Wales	- (2)	217 ± 63 (12)	210 ± 59 (54)	227 ± 68 (6)	227 ± 56 (11)
	Scotland	- (0)	216 ± 63 (27)	212 ± 61 (106)	249 ± 65 (20)	212 ± 52 (19)

Note: The mean serum urate ± the standard deviation are expressed in μmols per litre.
The numbers of each sex, for social class and country, are given within brackets.

RANDOM SAMPLES IN SUBJECTS WITHOUT GOUT

Although 21 of these practices agreed to participate, 2 failed to send any samples and one practice sent only 1 specimen and therefore was excluded. Of the remaining 18 practices, 14 agreed to send 10 randomly chosen specimens each (140 samples) and 131 samples were received. The other 4 practices each agreed to send 6 randomly chosen specimens each (24 samples) and 23 were received. Thus, 154 of the 164 samples were obtained (94%). The reasons for failure in the other 10 cases were 7 patient refusals, 1 broken specimen on arrival, 1 patients who had just moved practice and the doctor had not been aware when selecting the random cases, and the final patient was temporarily out of the area. Fortunately, all specimens arrived within 3 days of being taken.

A comparison of the serum urate values from the true random sample and the larger non-random survey are given in Table 26. The mean value of the serum urate from the true random sample does not differ significantly from the mean in the main survey in both males and females.

TABLE 26

COMPARISON OF SERUM URATE VALUES FROM MAIN NON-RANDOM SURVEY POPULATION AND THE TRUE RANDOM SAMPLE

	Main Survey	Random Survey
Number of Males	1421	75
Serum urate µmol/litre mean + Standard Deviation	298 + 73	292 + 72
Number of Females	1465	79
Serum urate µmol/litre mean + Standard Deviation	226 + 64	220 + 55

CHAPTER FOUR

DISCUSSION

METHODS

The Gout Survey within General Practice

It was decided to recruit practices which, as a group, would have a designation (urban, rural, mixed) and a size (single-handed, small group, large group practice) profile that would be in proportion to that within general practice in Great Britain. In view of the primary requirement that the practices had to record gout diagnoses and that their geographical locations should reflect the population density patterns for the U.K., it was found impossible to obtain a perfect fit. With the exception of the English mixed practices subgroup and the 4 or more principal practices for Great Britain as a total, the 2 parameters used in practice selection compare favourably with the national figures. In addition, the measurement of doctors participating by year of graduation when compared with the national picture provided a good fit with the exception of the younger doctors in Scotland who were in excess of the national picture. The year of graduation is not recorded in the official statistics, but the date of birth of each doctor is. For purposes of calculating year of graduation, the general rule of assuming graduation at 25 years of age was adopted.

Since certain areas, such as some new towns, have a predominantly young community, while other areas are favoured for retirement, it would be possible for the age/sex structure of the sample not to reflect that of the total population while giving a good fit for the practice and doctor parameters measured. Since the occurrence of gout increases with age, this comparison was deemed important. In the event it provided an excellent fit. Thus the sample was chosen by 2 practice parameters and checked by 2 separate measurements,

one involving the doctors and the other the patients. In view of the results it is believed that the sample can be accepted as reasonably, but not totally, representative.

The Biochemical Survey

All analyses in this survey were performed in one laboratory by the same technician and in this way errors in population sampling which may be caused by inter-laboratory variation or between technicians have been reduced.[38] The laboratory control data confirm a good standard of procedure.

The results of the study to validate the postal collection method allow confidence in the acceptance for analysis of samples up to 72 hours after withdrawal by venepuncture. Likewise, the results of the random sample study allow greater confidence in the results of the large non-random series as being representative of the general population.

THE PREVALENCE AND INCIDENCE OF THE DIAGNOSIS OF GOUT

Since overwhelmingly, doctors equated gout with gouty arthritis, it was felt justifiable to remove 8 cases who had not experienced acute articular or extra-articular (e.g. bursitis) episodes and thus create a group which was, in that respect, uniform in diagnosis.

Prevalence

The prevalence of the diagnosis of gout in Great Britain was shown to be 2.6 per 1,000 population which is in keeping with estimates

covering Europe and North America.[4, 5, 6, 11.] Nevertheless, the prevalence results are out of step with the Framingham findings.[7] On admission to the Framingham study, the patients were all in a limited age band of 30 - 59 years and at the time of the report in 1967, the mean age was 58 years. The prevalence rates in the over-45-year old groups for both sexes in this study might be considered a fairer comparison, but even these fall short of the U.S.A. results. The male to female prevalence ratio in the Framingham report was 7 : 1 while in the present study it was found to be 6.1 : 1. The results of the study show a striking difference in the prevalence of the diagnosis of gout in the three countries, with Scotland being the lowest at 1.3 per 1,000 of the study population, and England the greatest at 3.0 per 1,000 of the study population. Thus the pronouncement of Garrod[9] and the time-honoured, but unproven, belief of many physicians since then,[10] seems to have been confirmed. Or has it? That there is a striking difference in the frequency of the diagnosis being made in the three countries has been shown, but this is not of necessity the same as the frequency of the disease. However, while most ailments will be both over- and under-diagnosed during the practice of medicine, an examination of the diagnostic pattern and the clinical profile of the gout patients in each of the three countries yielded no statistical support for a significant degree of under-diagnosis in Scotland compared with England or over-diagnosis in England compared with Scotland. Furthermore, the attitudinal survey among the doctors in all three countries showed no obvious difference in attitude to the diagnosis of gout.

It has been noted from population studies in different parts of the world that the frequency of gout and the degree of hyperuricaemia in a community tend to occur somewhat hand in hand.[13] Therefore, it is interesting to note that the recent study by Sturge et al,[14] and the

present biochemical survey have shown no difference in the mean serum urate levels of population samples covering England, Wales and Scotland. Nevertheless, it must equally be stated that the occurrence of clinical gout requires more than just an elevated serum urate.

No doubt a number of factors are at play in creating the prevalence differences noted, and in this context it is worth remembering that gout has been shown to favour the higher social classes,[2, 22,] and this has been confirmed in the present survey. A statistical examination of the Economic Activity Tables for Great Britain[34] (Appendix VIa) shows that there is a larger proportion of the Scottish community in Classes 3, 4 and 5 than in England and Wales (X_1^2 = 457.6 : 0.1% level). Thus gout should be less prevalent in Scotland, although it is doubtful if this could explain the total difference. However, another factor is worthy of comment in this context. The World Health Organisation's Statistics[39] (Appendix VIb and c) shows the mortality rate from ischaemic heart disease to be greater in Scotland than in England and Wales. By the use of the Chi-squared test with Yates correction this difference, for both males (X_1^2 = 222.4 : 0.1% level) and females (X_1^2 = 226.6 : 0.1% level), is found to be significant. This is by no means new since, in 1963, Howe commented on the striking difference between the North and South of Great Britain in the mortality from ischaemic heart disease.[40] Gertler and co-workers[41] were first to note a statistically significant association of hyperuricaemia and coronorary heart disease, and although more recent studies, such as the Framingham Study,[7] suggest that hyperuricaemia is not a risk factor in ischaemic heart disease, the excess of deaths from ischaemic heart disease within Scotland might selectively reduce the pool of hyperuricaemic potential gout cases in that country.

Of the 966 cases, 10% were considered to be secondary gout with diuretic therapy being the most frequent causal agent. Secondary gout will be discussed more fully in the section entitled "The Gout Patient".

Incidence

As would be expected, the incidence of this diagnosis being made in each of the years from 1971 to 1975 in each of the three countries, varies in line with the prevalence. One factor regarding the incidence figures is that they are relatively high in comparison to the prevalence results, being related by a factor of less than 10. This phenomenon has previously been noted in epidemiological studies.[42]

The results of the various regions of England show much variation, with the frequency of the diagnosis, for both prevalence and incidence, occurring more often in the South than in the North and with a peak in the West Midlands. Since no attempt was made to ensure that the sample in every region of England was representative of that area, these results should be interpreted with more caution than those for the whole of England.

Prevalence by age and sex

In both sexes the prevalence is seen to increase with age, and it is interesting to note that while gout is infrequent in men below 45 years of age, thereafter the diagnosis occurs in excess of 1% of the male community. The prevalence in the male is greater at all ages than in the female sex, but it is worth noting that after 44 years, the rate of increase of the prevalence in females is considerably greater than in

the male; no doubt related to the onset of the menopause with its associated rise in serum urate to levels approaching or equal to those in the male.[43] While this is a fairly consistent pattern in all three countries, the diagnosis of gout in Welsh females is less than elsewhere with a resultant higher male to female ratio. Therefore, either the ladies of Wales have some special protection from this malady, or their doctors are less inclined than their English and Scottish counterparts to make the diagnosis in the female sex.

DIAGNOSING GOUT

Time Lag between Clinical Onset and Diagnosis

In 68.2% of the 600 cases the diagnosis was made within 2 months of the presenting features, approximately 61% being immediate and therefore implying a fully clinically based diagnosis. In 84.9% of cases a serum urate estimation was performed. In view of the previous finding it would seem that the major role of the serum urate measurement was a confirmatory one. It was certainly not considered mandatory since it was not found to be raised in 6.3% and not done in 15.1% of the cases at the time of these diagnoses. Since the delays in diagnoses show little variation by geographical location or type of practice there was nothing to suggest that a difference in diagnostic acumen in any of these sub-groups might account for the regional incidence and prevalence differences. Since it is predominantly a male disease, it is not surprising to note an early difference in the lag time between males and females. An immediate diagnosis was made in 62.3% of males while only in 54.7% of females. This difference was corrected by the end of the second month, and although not significant by the Chi-squared test may

reflect the doctor's greater desire for confirmatory tests before making the diagnosis in a female. A delay in diagnosis in excess of 2 months was noted about twice as often in those presenting with features other than a classical podagra and therefore being a more difficult diagnostic challenge.

Initial Diagnosis

In cases where gout was not the immediate diagnosis, a variety of erroneous diagnoses were used, although in 16.9% of cases the doctor was uncertain of the diagnosis and did not label the case at all. Among the preliminary diagnoses were other forms of arthritis, which included rheumatoid arthritis, psoriatic arthropathy and osteoarthritis. Table 10 which provides the data on preliminary diagnoses shows that 2 out of every 5 cases experienced a delay before being diagnosed as gout. This plus the data on the time lags before diagnosis associated with the 7.9% of diagnoses made in hospital might reflect to some extent the degree of missed diagnoses occurring in practice. Data on those initially diagnosed as having gout and subsequently considered to have an alternative diagnosis would provide an index of possible overdiagnoses of gout. Unfortunately, no data is available on this aspect, although a current study is in progress to evaluate both over and under-diagnosis of gout in practice.

Hospital Referral

In approximately 80% of the gout diagnoses studied, the patient was never referred to hospital in relation to gout. This no doubt reflects the large number of mild cases creating no complex management problem. In this context it is interesting to note that 5 out of 7 gout

patients diagnosed in hospital are referred back to hospital for further consultation, while only 1 out of 7 of those originally diagnosed in practice was referred for hospital consultation. Thus it can be reasonably said that the profile of gout as seen in general practice is somewhat different from that built up in hospital. While the rate of diagnoses in rural practices is the same as in urban practices, the subsequent referral rates to hospital are only one third of that in the urban group. This may reflect the greater isolation of such communities from hospital or a different attitude of the rural community.

The overall hospital referral rate was about 20% and this is in agreement with the referral rate for articular disease recorded in the Morbidity Statistics from General Practice.[3]

A comparison of the clinical features of patients referred to hospital with those not referred is included as a subsection of the section entitled "The Profile of the Gout Patient".

Diagnostic Criteria

Table 12 shows the frequency of utilisation of the various listed criteria in making the diagnosis of gout. Tophi were found only in 3.8% of cases, confirming the early stage of the disease in these patients at the point of diagnosis. The low occurrence of tophi, plus the fact that a response to colchicine was only recorded in 22.1% of the cases makes for practical difficulty in following the criteria for diagnosing gout in population studies proposed by Bennett and Wood.[16] In the same context it should be noted that the characteristic microcrystals of sodium urate monohydrate were sought in synovial fluid in only 3.8% of cases, no doubt a reflection of the low referral

rate (20.6%) to hospital. By no means do all patients referred to hospital with gout undergo an examination of their synovial fluid. The recent report from the Gout Classification Criteria Subcommittee of the ARA Committee on Diagnostic and Therapeutic Criteria[20] examined information on 178 gout patients submitted by 38 American rheumatologists from 38 different centres and showed that synovial fluid examination for crystals was undertaken in only about half of the cases. While crystals were sought in 3.8% of the cases in this study, they were found to be present in 3% (in 79% of cases where sought). The absence of crystals in synovial fluid does not invalidate the diagnosis of gout. Schumacher et al[17] recently reported 9 cases of gout in whom, during an acute attack, the first synovial fluid examination failed to reveal crystals, and they refer to similar findings by others and in addition discuss possible reasons for the negative finding. The Classification Subcommittee Report[20] showed a 15.6% failure rate to demonstrate crystals. In the present study the failure rate was 21%.

While it is not surprising that little weight seems to be placed on X-ray findings, since the majority of cases were diagnosed at an early rather than an advanced stage of their disease, it was surprising that weight should be placed erroneously on the response of the acute attack to phenylbutazone or indomethacin as a diagnostic parameter.

Family History

A surprise finding was that in only 284 (47.2%) of the cases was there a record of a family history of gout having been sought. These cases were evenly spread between those diagnosed early and late, and those presenting with a classical podagra or otherwise.

Therefore, there was no link with the ease or difficulty of diagnosis. This remarkable degree of non-recording does not necessarily indicate that the question was not asked, and within the attitudinal survey 74% of doctors claimed to enquire about a family history. This matter is discussed further in the section entitled "The Attitude of General Practitioners to the Diagnosis of Gout". Certainly such a degree of disinterest would be surprising since a positive family history can be a useful clue in the diagnostically difficult case of monoarthritis. While the information was available in less than half the cases, the percentage of positive cases agrees with that of 23.3% obtained from 456 patient returns (Questionnaire III). However, previous studies in these islands have yielded frequencies of 50 - 80%.[44] More recent publications have given a figure of 36% in an English hospital clinic[22] and 11% in Danes.[45] Yu states that in her clinic the figure is about 40% while admitting that in the U.S.A. literature the figures quoted are usually much lower.[46] Thus figures within the literature vary from 10 - 80%. Such wide variation no doubt relates to the sample studied, the extent of investigation, and perhaps the period when the investigation took place.

THE PROFILE OF THE GOUT PATIENT

Genetic pre-disposition coupled with environmental factors, largely of a socio-economic type, strongly influence the pattern of gout in a community.[13] During this century major socio-economic changes have occurred within Great Britain, coupled with the advent of effective therapy capable of preventing the natural progression of gout to the stage of tophaceous destruction of tissue structure and function. Grahame and Scott have published a recent and excellent

profile on the gout patient population referred to hospital,[22] but by no means are all gout patients so referred. Therefore, it was felt desirable to record the current clinical profile of patients diagnosed as having gout within the general practitioner environment.

The Age of Onset and Sex Profile

As would be expected, a distinctly higher percentage of women experienced the onset of their gouty arthritis as a later age than was found in the men. By the age of 54 years the onset of clinical gout has occurred in more than half of the males, but in only one third of the females. Since gout occurs much less often in females, it was not surprising to note a greater degree of hesitancy in coming to the diagnosis in the female than in the male.

The Framingham study[7] reported a 7 : 1 ratio which equates to 12.5% females in their study population while 15.6% of the present study were females. While this could be due to a large number of reasons, it is interesting to note that the mean age at the time of the first attack in the Framingham population was 48.7 years, while in the current study it was 52.3 years.

The Weight Pattern

This study showed 38.2% of the gout diagnosed patients to be 10% or more overweight. This is strikingly less than the 78% of 100 hospital cases[46] that were found to be 10% overweight, and also less than the more recent finding of 48% of gout cases being 15% or more overweight.[22] However, Talbott states "With but a few exceptions, the patients in our series are not overweight".[47] It was thought

that the difference from the Grahame and Scott study[22] might be explained on the basis of sampling, but an examination of the weight profile of those referred to hospital for diagnosis or subsequent management advice was no different from the profile of those not referred with gout. Equally, there was no observed difference in the weight profile between the Registrar General's social classes 1 to 5 groups. There are no available statistics on the national or regional weight profile or the trend in weight over the years. In an attempt to overcome this difficulty, when the gout patients were compared with the group of 2886 non-gouty people used in the biochemical study they were found to be significantly heavier.

The Frequency and the Seasonality of the Acute Attacks

The average attack rate was calculated among those cases who were receiving, at that time, no medication known to alter the rate. It follows that a large part of this group was likely to consist of less severe cases and therefore the average attack rate for all gout patients on no therapy would be somewhat higher.

While Fries[48] found no seasonal variation in 4,000 serum urate estimations performed over a 12 month period, Goldstein[49] noted higher levels in July and August among 12 young male volunteers when their serum urate was estimated regularly over a 12 month period. In addition, he claims to have induced significant urate elevations with artificial sunlight in 2 normal volunteers. Such seasonal urate elevations, demonstrating a summer peak, are interesting in the light of the claims of a number of investigators who state that the frequency of acute gouty arthritis is more marked in Spring and/or the Autumn.[47b] A rise or a fall in the serum urate has been shown to precede acute attacks of gouty

arthritis[50] and the early rise in serum urate to the summer peak with the subsequent drop after August, as shown by Goldstein,[49] could fit with such a pattern. If gout patients, like his volunteers, show a rise in serum urate levels in the summer, this follows the same pattern as the frequency of acute attacks of gouty arthritis shown in Figure 1.

Talbott[47b] found a correlation between a decrease in barometric pressure and the onset of acute arthritis. In the present study, while significantly more attacks were found in the summer than in the winter, no statistically significant seasonality of acute attacks of gouty arthritis could be supported when the data were submitted to critical analysis, and no correlation was shown between the occurrence of acute attacks and barometric pressure, temperature or humidity. However, the extremes of variation in weather factors in Great Britain are less than in some other parts of the world and this may explain the lack of any positive correlation within the present study. Also while a population study, such as this, does not support an association, it does not rule out the possibility in some patients, and certainly 1% of patients in the present survey believed weather changes to be a precipitating factor.

Joint Involvement

Among the 604 cases whose joint involvement has been studied, no case had a longer duration than 7 years from onset of the first acute episode. By the end of the study, 40.4% of the cases had more than one joint involved. The order of frequency of joint involvement in this study is the same as in a previous U.K. study,[22] although actual figures are smaller. The frequency of joint involvement in the hospital referred sub-group was seen to be much higher with the

exception of the great toe, than in the non-hospital group, suggesting perhaps that, as a group, their gout was more severe. This exception in the case of the great toe might suggest that less difficulty in diagnosis was experienced in the classical podagra presentation. Examination of the initial attack data shows most cases to present as a monoarthritis with approximately 40% involving joints other than the great toe. With the judicious use of the effective interval therapy currently available, we should be seeing an increasing proportion of gout patients with less extensive joint involvement, due to the natural process being arrested at an early stage.

Tophi

The occurrence of tophi is low at 4.6% (23 of 495 cases) but it should be remembered that the information relates only to the point of diagnosis and no doubt with the passage of time further tophi could develop. Certainly in the series reported by Kuzell et al,[49] 60% of the visible tophi were in patients whose gout had been symptomatic for more than 10 years. Here again, with the use of effective interval therapy in the management of gout patients, the finding of increasing numbers of visible tophi, after diagnosis, will become less likely. Such has been the cumulative experience in 1800 cases of gout in one clinic.[50]

Factors Precipitating the Acute Attack

Enquiry revealed 26% of the gout diagnosed patients to be convinced that their acute attacks of gout were precipitated by a certain factor. Although such beliefs are well established, it is difficult to know what weighting to give them, since it is human nature to attempt to explain the things that happen to us in the light of some recent event.

Personality

Assessment of the patients' personality, by the method used within this study, does not suggest an association of gout and flamboyant behaviour.

Social Class

Although the percentage unclassified in this survey for socio-economic status is higher than in the Registrar General's estimates in 1971, it should be noted that the percentage of gout diagnosed patients in social class grades 1 and 2 is higher and in grades 3, 4 and 5 is markedly lower than in the general population. Nevertheless, while gout continues to favour the higher socio-economic grades, the actual number within grade 1 is small relative to those in grade 3. These findings are compatible with those of previous studies in Great Britain.[2, 22.]

Alcohol Ingestion

In general gout sufferers can imbibe moderate quantities of alcohol without ill effect to their gout and with the availability of modern drugs, abstinence is no longer an important part of treatment. Nevertheless, it would seem that the old "colonel and port" image might still be around to some extent, since we see 35% of gout sufferers in this survey reducing their consumption and 4% totally abstaining.

Secondary Gout

The literature contains reports of varying frequencies of secondary gout. It has been suggested that the overall frequency runs between 5% and 10%[37] and the current findings are in agreement with that range. Not only the actual percentage of cases, but also the frequency of each causal condition within the group will depend on the source of the patient sample being studied. Since the present study group are from general practice, it is not surprising that diuretic therapy should be incriminated more frequently than myeloproliferative disorders. The usage of diuretics within a community increases with the age of the community and consistent with this, the occurrence of gout secondary to their use was also noted to increase with age. Of course, whether these cases are truly secondary gout or the precipitation of subclinical cases of primary gout is open to debate, since data on their urate status prior to diuretic therapy is not available.

Associated Chronic Conditions

Hypertension and Ischaemic heart disease. The finding of hypertension in 27.8% of cases falls within the range of 25.7%[51] to 52%[22] previously reported. Kohn and Prozan[53] proposed that in coronary artery disease hyperuricaemia should be considered as a risk factor, while Myers et al[54] did not agree. The Framingham study[7] showed coronary artery disease to be twice as frequent in gout sufferers as in normouricaemic non-gouty males. However, when the gout patients were excluded from the analysis, no association between coronary disease and hyperuricaemia could be demonstrated. Much of the recent literature, when

reviewed[55, 56, 57], provides reasonable grounds for believing that associated diseases, such as coronary disease and hypertension, may correlate with the level of obesity rather than the level of serum urate, which itself has been shown to be weight-related.[55] Although the volume of literature on urate and vascular disease is sizeable, it contains a number of conflicting findings and the whole field remains unclarified. The answer to this problem will require specifically designed, prospective, epidemiological studies, which ideally should be run in concert.

Diabetes Mellitus. The possibility of an association of diabetes mellitus with gout was first raised over 200 years ago by Whytt.[58] Although a number of workers, including McKechnie[59] and Berkowitz[60] have reported abnormal glucose tolerance in gout patients, more often than would be expected by chance, Boyle and his co-workers[61] in Glasgow concluded that there was no significant disturbance of carbohydrate and insulin metabolism in primary gout if due allowance was made for obesity in gouty patients. In a review of the published work on the prevalence of diabetes mellitus in gouty patients, Mikkelsen[62] showed the reported frequency to range from "rare" to 8%. The present study shows the association to occur in 2% of gout patients which is of the same order as would be expected in the community at large.[63]

In the present investigation, examination of the associated chronic conditions with weight revealed no correlation. However, a comparison with non-gout diagnosed patients with these conditions was not undertaken.

Myxoedema. This has been listed as an unexplained cause of hyperuricaemia[64] and reported in 1%[65] to 22%[51] of gout patients. In the present series it was recorded in 1.2% of patients, with a male to female ratio of 3 : 4. This represents a frequency in the males of 0.6% and in females 3.9% which is in accord with the usually found strong female preponderance in hypothyroidism. Nevertheless, it is in disagreement with the Scottish hospital discharge statistics study in gout[65] which recorded, for both sexes, a 1% level.

Renal Calculi. While the frequency with which renal stones occurs varies considerably in different geographical areas,[66] gout patients are more liable to develop renal stones than the general population.[67, 68] In the present study, renal stones were recorded in 6.1% of cases overall and in 11.5% of those referred to hospital. These findings are compatible with the literature in general and the latter with the Grahame and Scott hospital patient study.[22]

From a comparison of the profiles of the gout patient without renal stones and the gout patient with renal stones, it can be seen that while there are many similarities between the groups, there are also some noticeable differences. Most of these relate to the disease process, its diagnosis and treatment rather than the patient, and would seem to indicate that in the group of patients with renal stones, a more complex pathology was present.

No clear picture arises from which it would be possible to predict which gout patient will eventually get renal stones or in which patient presenting with renal stones is this the first symptom of gout. However, the results suggest that the patient presenting with renal stones before the onset of typical gouty symptoms, but who is

eventually diagnosed as having gout will have a higher incidence of other chronic conditions than the average gout patient.

Renal Parenchymal Damage. In 13 cases, damage of the renal parenchymal tissues was diagnosed and the frequency of associated renal stones, hypertension and diabetes mellitus was dramatically greater than in the total 604 gout cases under study. Therefore, while the aetiology of the renal damage in any particular case cannot be stated, it is likely that, as a group, a variety of causal factors are at play. In addition, 2 of the cases also had myxoedema which may cause a reduction in renal blood flow and tubular function.[69]

Hospital Referral

Since some degree of articular complaint might almost be looked upon as the norm in the elderly, it is not surprising that while referring few elderly people developing such a problem, doctors refer their younger sufferers fairly frequently to hospital. Gout is unusual in the female relative to the male, therefore one would expect a greater percentage of females to be referred to hospital than males; thus the finding that 21.2% of males, but only 16.7% of females were referred to hospital was surprising. It is possible that the explanation for this relates to the age of onset of gout in the female occurring later than in the male, associated with the finding that the rate of hospital referral decreased with the age of onset of gout. Equally, this could explain why, in this study, 15.6% of the total 1077 patients were female, while in their hospital clinic study Grahame and Scott[22] found only 9.7% of their cases to be female. Differences were noted also in the frequency of joint involvement. Patients whose first attack was in the great toe were less likely to be referred to hospital than the others, which no doubt reflects the

greater uncertainty in diagnosis in cases not demonstrating a classical podagra. Similarly, examination of the total joints involved shows a smaller frequency of involvement of the great toe and a higher frequency for all other joints in the hospital referred group. In addition, those with angina pectoris, myocardial infarction, congestive cardiac failure, hypertension and diabetes mellitus were more likely to be referred to hospital. These findings are in keeping with general practitioners referring to hospital cases which create a more difficult diagnostic or management problem. The overall hospital referral rate was about 20% and this is in agreement with the referral rate for articular disease recorded in the Morbidity Statistics from General Practice.[3]

Therapy

During the period of the investigation, 1971-75, only 44.8% of the gout diagnosed patients were on allopurinol or a uricosuric. Among the remaining 55.2%, while a number had mild gout with infrequent acute attacks, this was by no means the case in all of them. From the mass of literature which has accumulated on the subject of drug adherence,[70] it can be seen to be a most difficult problem and no group will be more difficult to persuade to take continuous medication on a long-term basis than gout patients feeling well between attacks. Where interval therapy was given, allopurinol appeared to be the drug of choice and for the acute attack, phenylbutazone was at the head of the list. Perhaps due to its gastrointestinal side effects, colchicine was infrequently used, and the high failure rate in obtaining a classical response with colchicine may have been due, in part, to the doctor being disinclined to push the dosage for the same reason. No data are available on the interval between onset of the acute attack and the commencement of colchicine therapy, and a delay here

is well known to reduce the frequency with which a classical response will be seen.

THE ATTITUDE OF GENERAL PRACTITIONERS TO THE DIAGNOSIS OF GOUT

During the course of their practice only one of the 160 doctors denied requesting serum urate estimations, although an additional 8 doctors stated that they did not normally do so when making a diagnosis of gout. Of the 160, 148 doctors felt that the serum urate test was of value. Only 38 (24.1%) stated that they did not believe the laboratory result to be consistently dependable. However, since 60% of the doctors, under certain conditions, repeated the test for confirmation of the result, none of them could have been consistently confident in the result. The test certainly was repeated more frequently when it was different from, rather than in agreement with, that expected on clinical grounds, and those who doubted the consistent dependability of the result, not surprisingly, did confirmatory repeat tests more frequently than the others.

While biochemical facilities are available to virtually every practitioner in the country, the blood sample does require to be taken or posted to the laboratory. Therefore, the question was asked about a simple test that could be done in the surgery to see if this would increase utilisation of serum urate testing. Three out of every 5 doctors (95 of 160) in the survey felt that such a test would increase the frequency with which they would measure the serum urate level in their patients. Among this group of 95 doctors were 28 doctors who felt that the present testing available to them was not

consistently dependable. Assessment by the Chi-squared test showed a definite correlation with dissatisfaction over the consistency of results using current methods. Thus their response was not simply based on convenience and the uptake of such a test would be dependent on its ability to provide a consistent result.

The present study of the gout patient in general practice showed that 44.8% were on allopurinol or a uricosuric for correction of their hyperuricaemia and the present study of doctors within these practices shows that more did checks periodically of the serum urate level in these patients than in the others. Nevertheless, the clinical status of this untreated group was by no means consistently less severe than those on treatment. Furthermore, there was no apparent correlation between the behaviour of the doctors regarding follow-up serum urate checks and their beliefs, as a group, regarding a possible associated increase in morbidity or mortality. Therefore, it is not possible to say what motivates some doctors to carry out such checks on their patient's biochemical status while others do not feel there is a need.

Although 81.5% of the doctors rightly stated that gout is associated with a greater frequency of some conditions than occurs in the population at large, with the exclusion of some cases of associated renal insufficiency and of renal stones, there is no hard evidence to causally link hyperuricaemia with any of the reported associated diseases such as hypertension. Today, with the aid of modern therapy, the lot of the gouty community has been improved dramatically and no longer need we see a markedly deformed tophacheous patient with renal insufficiency and calculi. While older reports within the medical literature quote a high number of

gout patients dying of renal failure, current informed opinion estimates that the mortality rate in gout patients is in line with that found in the population at large.[37]

Of the 159 doctors replying, 117 (74%) stated that they enquired about a family history. Since all doctors' lists are not of the same size, and the frequency of gout as a diagnosis has been shown to vary significantly in different regions of Great Britain, the percentage of doctors stating that they ask about a family history cannot be truly compared with the frequency with which this factor is recorded within the patient records. Nevertheless, it seems high when compared with the results of the study into the diagnosis of 602 gout patients which showed evidence of the recording of this fact in only 47.2%. Any variance might be due to the data not having been recorded in all the cases where it was sought and certainly it was recorded in at least some of the cases in all the practices which stated, within this attitudinal survey, that they made this enquiry. Certainly, none saw the absence of a family history as influencing the diagnosis. The results in this study relating to a search for tophi and the request of serum urate estimations as part of the normal routine are in agreement with the findings of the gout survey within these practices.

The diurnal and hebdomadal variation of the serum urate is sufficient to allow a patient to undulate between the upper normal range and a level in excess of normal.[71] In addition it is not unknown for the occasional gout patient to have a serum urate well within the normal range.[72] Therefore, it is interesting that as many as 88 (55.3%) of the 160 doctors believed that such a finding would exclude the diagnosis of gout irrespective of what other features were present.

This suggests that a somewhat too heavy reliance is placed on this measurement by some. Conversely, 60 (38.2%) of the doctors would appear to place very little reliance on the test since, when the serum urate result was reported within the normal range, and this was inconsistent with that anticipated, they stated that they would not repeat the test. In a similar vein, of the 25 doctors who tend to refer cases in the hope of obtaining examination of the patients' synovial fluid for sodium urate monohydrate crystals, 19 wrongly felt that a negative finding would exclude the diagnosis of gout. While a very reasonable belief, it is not correct. A negative result has been shown to occur in 15.6%[20] to 21% in the present gout survey. Schumacher et al[17] as well as reporting on their false negative results, and commenting on those of others, have reviewed the possible reasons for such false negatives. The small referral rate for this test and for X-ray usage in the normal routine are compatible with the findings in the diagnosis of gout project conducted within these practices. The same can be said for the use of colchicine and the use of phenylbutazone and indomethacin as therapeutic tests. Although phenylbutazone and indomethacin are effective in the treatment of the acute attack, the response they produce in an inflamed joint is in no way specific to gout. Therefore, it was surprising to find that 65% of the doctors used it as a therapeutic test in diagnosis.

It is interesting to note that when asked which tests they would use to assist them in coming to a diagnosis of gout, if all were equally freely available, significantly fewer stated that they would rely on a family history, the presence of tophi, or the use of phenylbutazone/indomethacin, while their utilisation of X-rays and synovial fluid examination would increase, in relation to the findings stated to be their normal routine use. While abandonment of reliance on a

therapeutic test involving phenylbutazone or indomethacin is commendable, it is always worth enquiring about a family history and especially if the case is a difficult diagnostic problem. While in the diagnosis of early cases tophi are infrequently found, they are such a strong diagnostic factor that their presence should always be sought.

THE SERUM URATE PROFILE IN SUBJECTS WITHOUT GOUT

All analyses in this survey were performed in one laboratory by the same technical staff and in this way errors in population sampling which may be caused by inter-laboratory variation or between technicians[38] have been reduced.

The results of the present survey showed mean serum urate levels comparable with those of other surveys[43, 73] using the enzymic method for urate analysis. As would be expected, the results of this survey are slightly lower than a recent U.K. survey by Sturge et al[14] where a colorimetric method was used.

There was no significant regional difference in either the incidence of hyperuricaemia or in the mean serum urate levels. The lower prevalence of gout in Scotland which has been accepted since the time of Garrod[9] and confirmed within this present survey cannot therefore be explained by any regional variation in serum urate.

All other parameters measured were also similar between the three countries and gave no clue as to the reason for the lower prevalence

of gout in Scotland. It may be that the Scots are protected in some way from the effects of hyperuricaemia or that some other factors may be at play, such as those raised within the discussion on prevalence.

The most important factors predicting for serum urate were sex, weight and age. As expected, the males had higher serum urates than the females. The relationship of obesity to hyperuricaemia is well known[14, 41, 74] and was confirmed in our survey. Interestingly, body weight gave a stronger correlation with serum urate than did either Ponderal Index or Lean Body Mass and this is in contrast with the study of Acheson and O'Brien[75] who found that the Ponderal Index was a better predictor of serum urate, but is in agreement with the recent study of Sturge et al[14] who also found that body weight gave the strongest correlation.

Age was correlated with serum urate for both males and females, but only females also showed a correlation with blood urea. The urea correlation in the females may be explained by the positive age correlation together with the fact that blood urea rises with age.[76] The negative correlation of age with serum urate in the males is interesting although it was a very small factor at 0.5%. It is likely that this tendency for the serum urate in men to fall with age is a reflection of the reduction in body mass seen with aging. This tendency is probably masked in the female due to the marked rise in serum urate attributable to the menopause. A similar sex difference of urate with age can be seen in the Tecumseh study.[43]

In common with studies from the U.S. which have shown a correlation of serum urate with social class,[77] or academic achievement,[78] the males in the present survey showed an association

of serum urate with social class. Interestingly, this is in contrast with 2 U.K. surveys[14,73] which failed to show a correlation in either males or females. This difference between the results of the present survey and previous U.K. surveys may be explained by different sampling methods used.

In conclusion, this survey has attempted to fill a number of the gaps in the general knowledge of gout and the gouty patient within Great Britain. Among the many facets of the results which have been discussed none is more intriguing than the prevalence estimates which show a significantly greater frequency of the diagnosis of gout in England and Wales than in Scotland. That it should be so, while the estimated urate profile in the three countries is the same, makes it even more curious. A social class structure difference has been shown which would favour a greater English than Scottish prevalence but this is insufficient to be more than a part explanation. Currently, a new programme of work has been commenced to unravel the fascination of this unknown.

APPENDICES

QUESTIONNAIRE I

APPENDIX I

PRACTICE NO.

Enclosure 1.

Patient Name	Date of Birth	Sex		Occupation in Precise Terms	Year of diagnosis	Gout		If Secondary, state cause	Has moved practice - Year of move	Died - year of death
		M (✓)	F (✓)			Primary (✓)	Secondary (✓)			

Patient Questionnaire Code No: [ ]

Enclosure 2

PATIENT QUESTIONNAIRE - GOUT

(TO BE COMPLETED BY PRACTICE)

1. Practice No. [ ]

2. Patient No. or Name [ ]

3. Date of birth [ ]

4. Sex [ ]

5. Ethnic Group (Please tick (✓)

European [ ]

Non-European [ ]

If Non-European, please specify Ethnic Origin _____

6. Would you consider this patient to be: (Please tick (✓)

thin [ ]

normal/average [ ]

moderately overweight [ ]

grossly overweight [ ]

7. Where would you place, by use of a cross (x), this patient's personality on this scale :

[ ][ ][ ][ ][ ][ ][ ]

Introvert Extrovert

8. Please write precise year of diagnosis of gout in box [ ]

9. How long prior to the definitive diagnosis of gout being made did the clinical features of gout first appear ? (Please tick (✓)

- 0 - 1 month ☐
- 1 - 2 months ☐
- Up to 1 year ☐
- 1 - 2 years ☐
- 3 - 4 years ☐
- 5+ years ☐
- unknown ☐

10. Which clinical features of gout were present prior to the definitive diagnosis being made ? (Please tick (✓)

- an acute arthritis ☐
- joint pains ☐
- renal stones ☐
- skin tophi ☐
- known family history (of gout) ☐

11. Prior to the definitive diagnosis (gout), what was the preliminary diagnosis? If none, state 'none' ☐

12. Who made the diagnosis of gout? (Please tick (✓)

- you ☐
- partner ☐
- previous practice ☐
- hospital clinic ☐
- If other, please specify ☐

13. In relation to gout and subsequent to the diagnosis having been established, has the patient been referred to hospital? (Please tick (✓)

- Yes ☐
- No ☐

14. On what information was the diagnosis based? (Please answer all 10 questions listed by ticking (✓) in the appropriate column.)

	Present	Absent	Not investigated Not asked or (✓) unknown
i) acute arthritis			
ii) "rheumatic" pains			
iii) tophi			
iv) raised serum uric acid			
v) urate crystals in tissue or joint			
vi) clinical history			
vii) family history			
viii) response to colchicine			
ix) response to phenylbutazone or indomethacin			
x) diagnostic X-ray appearance in bone			
* xi)			
* xii)			

*If other criteria used in coming to the diagnosis of gout, please list above against xi and xii.

15. Has this patient ever suffered from any of the following diseases? Please tick in 3rd column if disease preceded onset of gout.

	Yes (✓)	No (✓)	Preceded onset of gout (✓)
cerebrovascular disease			
angina pectoris			
myocardial infarction			
congestive cardiac failure			
peripheral vascular disease			
renal parenchymal disease			
renal stones			
hypertension			
diabetes mellitus			
hypothyroidism			
i)			
ii)			

* If other chronic diseases, please list against i) and ii) above

16. Which of the listed joints are known to have been involved at any time. Please answer all questions and if you cannot answer 'yes' or 'no', please tick (✓) in Column 3.

	Yes (✓)	No (✓)	3 (✓)
big toe			
ankle/foot			
knee			
hip			
finger			
wrist			
elbow			
shoulder			
tempero mandibular			
sternoclavicular			
sacroiliac			
spine			
*others i)			
ii)			

If others, please specify against i) and ii) above

17. Please specify the joint or joints involved in the first attack. If unknown, please state 'not known'. [ ]

18. a) During any single attack of gout, has the patient ever had more than one joint involved. (Please tick (✓) Yes ☐

b) If yes, state joints [ ] No ☐

19. a) Is this patient's gout believed to be primary or secondary. If unknown, please use 'not known' box. (Please tick (✓)

Primary ☐

Secondary ☐

Not known ☐

b) If gout is believed to be secondary, what is the causative factor? (Please tick (✓)

diuretics ☐ leukaemia ☐ other malignancies ☐

cancer therapy ☐ polycythaemia ☐ *other conditions/ drugs ☐

chronic lead poisoning ☐ multiple myeloma ☐

* If others - please specify [ ]

20. Has this patient consulted you because of his gout?
Please tick (✓) Yes or No for each year listed. In Column 3 tick (✓) against each year he has had one or more acute attacks. In Column 4 state number of attacks if known. In Column 5, list separately for each attack, the month in which it occurred.

	1. Yes (✓)	2. No (✓)	3. Acute attacks (✓)	4. Number	5. List month (s)
1971					
1972					
1973					
1974					
1975					

21. Please indicate this patient's current gout therapy and indicate if the drug is given as continuous or intermittent treatment or for acute attacks only, by ticking (✓) under the appropriate column.

	As continuous therapy	As intermittent therapy	For acute attacks only
aspirin			
indomethacin			
phenylbutazone			
allopurinol			
ethebenecid			
probenecid			
sulphinpyrazone			
colchicine			
*			

*If others, please list above and tick appropriate columns as with other drugs.

PRACTICE NO. Enclosure 3

PATIENT QUESTIONNAIRE

1. Please state your height and weight:

   Height:_____feet_____inches

   Weight:_____stones_____pounds

2. Please state your precise occupation. For example, there are many kinds of managers and many kinds of engineers, etc., so it is important that you state your occupation fully. If you are retired, please state what your occupation was, and put a tick (✓) in the box marked "retired". If you are a married woman, please state your husband's occupation as well as your own.

   Own occupation_____

   Husband's occupation_____ Retired ☐

3. a) Do any of your blood relatives (excluding relatives by marriage) have gout? Please tick (✓) in appropriate box

Yes	No

   b) If you ticked "Yes", please state how many blood relatives.

Number

4. If you can remember, please state in which year you were first told you suffered from gout

Year

5. Some gout patients find that alcohol (e.g. port), certain foods (e.g. sardines), exercise and so on, can bring about an attack of gout. What things bring on an attack of gout in your case? If you have not noticed that some particular things bring on your gout attacks, then please state "nothing".

_____

_____

_____

6. People who suffer from gout have many different attitudes to alcohol consumption and their gout. Please answer the following questions by ticking the appropriate box in each case.

   a) Did you drink alcohol before you developed gout?

Yes	No

   b) Do you still drink alcohol?

Yes	No

   c) Have you reduced your alcohol consumption since developing gout?

Yes	No

   d) Were you given medical advice to reduce your alcohol intake?

Yes	No

LETTER ACCOMPANYING

QUESTIONNAIRE III

APPENDIX IIIa

Date

Dear

Currently I am assisting a doctor who is involved in research with gout and its problems. At this stage in the research he urgently needs the answer to a number of questions to help him build up a picture of the gout sufferer of today. While I can supply him with much of the information he needs, I cannot supply him with all the answers in every case. For this reason, we are dependent on the co-operation, first and foremost, of people like yourself.

To safeguard your privacy and confidentiality, I am sending the attached list of questions to you. As you will see, this sheet does not reveal your name or address, and I hope that you will complete it and send it to Dr. Currie in the enclosed stamped addressed envelope.

Please try and find the time to answer this short list of questions. Thank you very much for your attention and, I hope, for your help in this national research project into gout.

Please help.

Yours sincerely,

PRACTICE NO. Enclosure 4.

DOCTOR QUESTIONNAIRE

(on Uric Acid and Gout)

1. Year of joining present Practice ☐

2. During the course of your practice do you request serum uric acid estimation? (Please tick (✓)
   Yes ☐
   No ☐

3. Do you consider that the results of this laboratory test can be relied upon to give, consistently, a true reflection of the level of uric acid in your patients' serum? (Please tick (✓)
   Yes ☐
   No ☐

4. Please answer a(i & ii) and b(i & ii) by ticking (✓) appropriately.

   Having requested a serum uric acid estimation, whether the result is normal or raised, do you routinely repeat it for confirmation -

   a) If the result is inconsistent with what was anticipated and

      i) the result is normal — Yes ☐ No ☐
      ii) the result is raised — Yes ☐ No ☐

   b) If the result is consistent with what was anticipated and

      i) the result is normal — Yes ☐ No ☐
      ii) the result is raised — Yes ☐ No ☐

5. If you repeat the serum uric acid test for confirmation of result, how many times do you normally do so? If this is not your habit, please tick (✓) the box "not repeated".
   Not repeated ☐
   1 repeat ☐
   2 repeats ☐
   3 repeats ☐
   more ☐

   If you have ticked (✓) "more", please specify _____

6. In patients who have a confirmed raised serum uric acid, do you repeat periodically their serum uric acid test -

a) If they are on long-term therapy with drugs which reduce the serum uric acid (allopurinol, probenecid, sulphinpyrazone - trade names printed on attached slip) — Yes ☐ No ☐

b) If on no therapy to reduce the serum uric acid. — Yes ☐ No ☐

7. If you could have access to a method of estimation of the serum uric acid on one drop of blood from a finger prick (similar to Dextrostix) - (Please answer a) and b) by ticking (✓) appropriate box)

a) Would this be of value in your practice? Yes ☐ No ☐

b) Would it increase your utilisation of the serum uric acid test in the routine assessment of your patients with conditions affecting their joints? Yes ☐ No ☐

8a. Do you think that if a patient has gouty arthritis he will run a greater risk of developing other conditions? Yes ☐ No ☐

8b. Do you think that gout is associated with an increased mortality? Please tick (✓) Yes ☐ No ☐

9a. In making the diagnosis of gout, which of the listed factors do you normally look for? (Please tick (✓) in Column A).

9b. Which of these factors do you accept as the absolute minimum to establish the diagnosis of gout? (Please tick (✓) in column B).

9c. Please tick those factors listed whose SOLE absence (irrespective of what else is present), in your opinion, would exclude the diagnosis of gout. (That is, assess each of the listed factors in turn and use Column C).

9d. Assuming that all the listed factors or tests are freely available to you (directly or via your local hospital); to assist you in coming to a diagnosis of gout, which do you consider of value and therefore would use? (Please tick (✓) in Column D).

	A Normal Routine	B Minimum Requirement	C Exclusion Factors	D Factors of value
Family History				
Patient Clinical History				
Patient Dietary History				
Painful Swollen joint				
Tophi				
Raised Serum Uric Acid (SUA)				
Raised Erythrocyte sedimentation rate (ESR)				
Urate Crystals in Tissue or joint				
Diagnostic X-ray appearance in bone				
Response to Colchicine				
Response to Indomethacin/ Phenylbutazone				
*Other Factors				

*If others, please record in empty spaces above and tick (✓) appropriately in Columns A - D.

SERUM URIC ACID ASSESSMENT

PATIENTS

A total of 60 patients from each practice are required to provide a 10 ml. blood sample.

The 60 patients should comprise 10 (i.e. 5 males and 5 females) from each of the following age groups:

1) 15 to 24 years
2) 25 to 34 years
3) 35 to 44 years
4) 45 to 54 years
5) 55 to 64 years
6) 65 and above years

Patients should not be selected on the basis of a known normal or abnormal serum uric acid. The patients should not be specially selected other than in line with the selection criteria mentioned below, and otherwise all patients are eligible. Typical patients would be those attending surgery with the following diagnoses: angina pectoris, post-myocardial infarction, varicose veins, peptic ulcer group, anxiety states, chronic bronchitis, etc.

It is essential that the patients are not specially selected. When looking for volunteers to return in the fasting state, patients should be asked to present themselves until 10 volunteers (5 males and 5 females) are obtained for each of the six groups. If you specially select patients they cannot be considered as an "unselected" sample reflecting the total patient community.

Since serum uric acid levels are affected by both environmental and hereditary factors, I would be grateful if you would state the patient's ethnic origin on the top of the record sheet.

SELECTION CRITERIA

1) No past history of jaundice.

2) Not on any of the following drugs by prescription or self-medication:

Thiazide diuretics

Bendrofluazide	Aprinox, Berkozide, Centyl, Centyl-K Neo-NaClex, Tenavoid, Abicol.
Chlorothiazide	Diupres, Saluric
Chlorthalidone	Hygroton
Clopamide	Brinaldix
Clorexolone	Nefrolan
Cyclopenthiazide	Navidrex, Navidrex-K, Navidrex-Serpasil-K
Hydroclorothiazide	Direma, Esidrex, Esidrex-K Hydro-Saluric, Moduretic, Salupres

Hydroflumethiazide	Hydrenox, NaClex, Diademil, Rautrex
Methyclothiazide	Enduron, Enderonyl
Polythiazide	Nephril
Quinethazone	Aquamox
Mercurial diuretics	None marketed here.
	Aspirin
Pyrazinamide	anti-t. b. drug Zinamide
Nicotinic acid	
Adrenaline	no trade name here except in inhalators such as Asma-Vydrin, Asthmasan, Astmosana, Brovon, Medihaler-Epi, Neo-Rybarex, Riddobron, Riddofan, Riddohaler, Rybarex, Rybarvin and Silbe Asthma Inhalant; some local applications also carry trade names.
Noradrenaline	Levophed
Angiotensin amide	Hypertensin
Azaserin	antimicrobial and antifungal - no trade name
Probenecid	uricosuric - Benemid, Colbenemid
Sulphinpyrazone	uricosuric - Anturan
Methicillin	antibiotic - Celbenin
Coumarins	
Dicoumarol	no trade name
Ethylbiscoumacetate	Tromexan
Nicoumalone	Sinthrome
Phenprocoumon	Marcoumar
Warfarin	
Acetohexamide	oral hypoglycaemia, Dimelor
Phenylbutazone	analgesic, anti-inflammatory Anpuzone, Benzone, Butaphen, Butazolidin, Butazolidin Alka, Butazone, Delta-Butazolidin, Ethibute. Flexazone, Ia-But, Irgapyrin, Oppazone, Parazolidin, Tetnor, Butacote, Phebutopak.
Corticotrophin	Acthar, Corticotrophin, Acthar Bel, Cortico-Gel, Cortrophin ZN, Crookes' ACTH/CMC
Allopurinol	Zyloric

3) If on any of (2) then stop drug(s) for a minimum of one week before taking sample. This will only apply where patient is due to stop drug anyway.

4) Refusal to volunteer.

N. B.

Patients taking the contraceptive pill need not be excluded from the survey, but a note to this effect should be added to the patient record sheet.

SAMPLE should be taken in the fasting state, i. e. after an overnight fast and no breakfast. The samples should be taken in the region of 8. 00 to 9. 00 am The duration of the fast should be 12 hours minimum.

Thursday and Friday should be avoided to overcome the problem of samples being caught up in the postal system or over the weekend.

Samples should be posted during the same morning as they are taken in order that they arrive at the laboratory within 24 hours.

Method

1) Blood to be taken by venepuncture
2) Put 10 ml. of blood into a clean, dry, glass container.
3) Label will contain patient number.
   Record patient details on sheet with same patient number.
4) Post sample and sheet immediately by first class mail.

RECORD SHEET (see specimen)

Box marked 'Diagnosis' this requires the reason for the patient's present visit.

Box marked 'Other Diagnosis' this should include all chronic problems such as renal disease, hypertension, cardiac problems, vascular insufficiency (cerebral, coronary, peripheral), diabetes mellitus or other endocrine diseases, etc.

Smokers should be asked the approximate time since they last smoked. If this is less than three hours, record to the nearest quarter of an hour.

MATERIALS PROVIDED

1) Clean, dry, glass container for blood (+ label with patient's number)
2) Patient record sheets
3) Packaging materials for despatch of completed samples.

RESULTS

I shall send you a list of the results for each patient, listed where possible against NHS number. Therefore you should keep a list of each patient's name if you wish this service.

RECORD SHEET

Patient No.	Ethnic Origin:
B. P. in mm. Hg. (casual, standing)	N. H. S. No.
	Weight / Height
Tobacco smoker** / Yes / No	
If yes - hours since last smoke	Age / Sex
Occupation*	Other Diagnosis
Diagnosis	

	Drugs stopped	Sample taken
Date		

Family history of gout**	Yes	No

* If housewife, give husband's occupation

** Please tick appropriate box

APPENDIX VI(a)

BREAKDOWN BY SOCIAL CLASS OF THE POPULATION OF SCOTLAND AND OF ENGLAND AND WALES.

Social Class	England & Wales		Scotland	
	No.	%	No.	%
1	87305	3.2	8081	2.9
2	434589	15.7	41465	14.9
3	1205875	43.7	121962	44.1
4	505517	18.3	54908	19.9
5	195485	7.1	25668	9.3
Unclassified	331338	12.0	24546	8.9
Total	2760109	100%	276630	100%

Economic Activity Tables, Part IV, Table 29, 1971 Census Great Britain (on 10% sample), H.M.S.O. 1976.

APPENDIX VI(b)

DEATH RATES SPECIFIC FOR SEX AND AGE, PER 100,000 POPULATION IN ENGLAND AND WALES

Sex	Age groups in years							
	All ages	15 - 24	25 - 34	35 - 44	45 - 54	55 - 64	65 - 74	75+
Both sexes	308.9	0.2	3.9	37.7	167.6	454.7	1109.4	2734.3
Males	364.4	0.4	6.5	64.2	286.5	730.6	1650.3	3516.0
Females	256.3	0.1	1.3	10.6	51.9	205.2	708.0	2376.6

The above data was obtained from World Health Statistics Annual (1976) Volume 1. Vital Statistics and Causes of Death (1973-1976), p.671. Geneva.

APPENDIX VI(c)

DEATH RATES SPECIFIC FOR SEX AND AGE, PER 100,000 POPULATION IN SCOTLAND

Sex	Age groups in years							
	All ages	15 - 24	25 - 34	35 - 44	45 - 54	55 - 64	65 - 74	75+
Both sexes	363.3	0.4	4.5	50.6	226.7	623.8	1375.6	3327.9
Males	426.3	0.5	8.0	87.5	372.7	968.0	2037.2	4237.0
Females	305.1	0.3	0.9	15.3	91.3	330.6	910.0	2913.1

The above data was obtained from World Health Statistics Annual (1976) Volume 1. Vital Statistics and Causes of Death (1973-1976), p. 687. Geneva

APPENDIX VII

LONDON AIRPORT (HEATHROW)

YEAR / MONTH	PRESSURE mb			TEMPERATURE °C			HUMIDITY %		
	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.
1971									
JAN	10265	9721	9993	13.2	-4.2	4.5	100	60	80
FEB	10404	9736	10070	11.5	-2.7	4.4	100	49	75
MAR	10371	9772	10071	14.0	-4.0	5.0	100	29	65
APR	10321	9934	10127	21.6	-1.0	10.3	100	32	61
MAY	10256	9966	10111	23.7	2.1	12.9	99	34	67
JUN	10246	10003	10124	23.5	6.8	15.2	99	37	68
JUL	10330	10030	10180	29.7	8.3	19.0	99	32	66
AUG	10261	10002	10131	26.5	8.7	17.6	98	41	70
SEP	10332	10089	10210	24.3	4.0	14.15	100	28	64
OCT	10359	10034	10196	23.7	1.9	12.8	100	37	69
NOV	10344	9887	10115	16.9	-3.0	6.95	100	52	76
DEC	10402	10023	10212	14.6	-0.1	7.25	100	68	84
1972									
JAN	10270	9862	10066	11.2	-9.3	0.95	100	56	78
FEB	10241	9802	10022	11.7	-8.4	1.65	100	58	79
MAR	10305	9804	10055	19.6	-0.6	9.5	100	33	67
APR	10286	9829	10058	15.9	1.6	8.75	97	32	65
MAY	10209	9963	10086	20.1	3.3	11.7	97	32	65
JUN	10220	10032	10126	20.7	4.4	12.55	100	36	68
JUL	10305	10027	10166	27.7	7.4	17.55	98	35	67
AUG	10293	10004	10149	25.6	8.2	25.6	97	32	65
SEP	10321	9989	10155	23.9	4.0	13.95	100	29	65
OCT	10347	9958	10153	22.3	1.9	12.1	100	31	66
NOV	10374	9776	10075	16.5	-2.5	7.0	100	56	78
DEC	10381	9910	10146	14.1	-3.9	5.1	100	62	81

LONDON AIRPORT (HEATHROW)

YEAR — MONTH	PRESSURE mb			TEMPERATURE °C			HUMIDITY %		
	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.
1973									
JAN	10413	9890	10152	10.9	-3.8	3.55	100	64	82
FEB	10354	9768	10061	10.8	-4.0	3.4	100	43	72
MAR	10345	10041	10193	17.5	-2.6	7.45	100	36	68
APR	10315	9884	10100	18.0	-0.2	8.9	97	30	64
MAY	10275	9965	10120	24.9	3.6	14.25	100	31	66
JUN	10345	10073	10209	27.9	6.5	17.2	99	23	61
JUL	10265	9971	10118	27.9	7.1	17.5	100	37	69
AUG	10288	10011	10150	31.4	9.3	20.35	99	27	64
SEP	10300	9925	10113	29.9	5.5	17.7	100	40	70
OCT	10371	9910	10141	21.9	0.4	11.15	100	39	70
NOV	10362	9972	10167	15.8	-4.5	5.65	100	46	73
DEC	10378	9840	10109	12.2	-4.4	3.4	100	50	75
1974									
JAN	10340	9907	10124	13.9	-1.5	6.2	100	56	78
FEB	10359	9704	10032	12.8	-1.2	5.8	100	42	71
MAR	10303	9905	10104	17.7	-1.9	7.9	100	35	68
APR	10299	9972	10136	20.3	1.7	11.0	99	27	63
MAY	10264	9977	10121	22.3	1.6	11.95	97	30	64
JUN	10282	9994	10138	25.3	5.6	15.45	98	30	64
JUL	10258	10027	10143	24.4	8.4	16.4	99	39	69
AUG	10317	10024	10171	24.6	7.8	16.25	100	38	69
SEP	10300	9832	10066	21.8	2.4	12.1	100	35	68
OCT	10264	9911	10088	13.8	-0.1	6.85	100	43	72
NOV	10306	9849	10078	14.4	0.4	7.4	100	59	80
DEC	10442	9994	10218	14.7	0.7	7.7	100	53	77

LONDON AIRPORT (HEATHROW)

YEAR / MONTH	PRESSURE mb			TEMPERATURE °C			HUMIDITY %		
	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.
1975									
JAN	10366	9884	10125	14.5	-0.5	7.0	100	51	76
FEB	10387	10003	10195	12.8	-0.8	6.0	100	40	70
MAR	10295	9941	10118	13.8	-1.5	6.2	100	44	72
APR	10335	9966	10151	21.5	-1.6	10.0	100	38	69
MAY	10351	10045	10198	22.2	3.9	13.1	99	32	66
JUN	10317	10007	10162	27.6	3.5	15.6	100	26	63
JUL	10313	10028	10171	30.6	10.1	20.4	97	31	64
AUG	10308	10069	10189	34.2	8.6	21.4	99	25	62
SEP	10314	9866	10090	24.0	6.2	15.1	100	41	71
OCT	10346	10029	10188	18.3	3.7	11.0	100	46	73
NOV	10324	9895	10110	14.3	-2.5	5.9	100	60	80
DEC	10395	9878	10137	12.3	-5.4	3.5	100	61	81
197									
JAN									
FEB									
MAR									
APR									
MAY									
JUN									
JUL									
AUG									
SEP									
OCT									
NOV									
DEC									

ELMDON (BIRMINGHAM)

YEAR — MONTH	PRESSURE mb			TEMPERATURE °C			HUMIDITY %		
	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.
1971									
JAN	10242	9719	9981	13.0	-7.6	2.7	100	53	77
FEB	10419	9766	10093	11.9	-8.0	2.0	100	50	75
MAR	10384	9740	10062	13.1	-5.9	3.6	99	41	70
APR	10335	9942	10139	19.2	-1.9	8.7	100	41	71
MAY	10247	9969	10108	20.8	-1.2	9.8	100	30	65
JUN	10248	9992	10120	21.7	3.8	12.8	100	41	71
JUL	10339	10012	10176	26.3	3.9	15.1	100	36	68
AUG	10248	9976	10112	23.8	4.1	14.0	100	42	71
SEP	10322	10077	10200	24.2	2.3	13.3	100	26	63
OCT	10380	9992	10186	22.6	-1.7	10.5	100	46	73
NOV	10324	9873	10099	15.9	-5.1	5.4	100	44	72
DEC	10405	9996	10201	14.2	-4.6	4.8	100	55	78
1972									
JAN	10280	9834	10057	10.5	-10.1	0.2	100	54	77
FEB	10262	9790	10026	9.3	-2.1	3.6	100	49	75
MAR	10335	9790	10063	18.0	-2.0	8.0	100	36	68
APR	10309	9815	10062	16.0	0.5	8.3	98	41	70
MAY	10237	9926	10082	16.8	-0.2	8.3	99	43	71
JUN	10238	10010	10124	18.4	2.0	10.2	100	43	72
JUL	10312	10031	10172	24.9	2.9	13.9	100	44	72
AUG	10300	9950	10125	22.8	4.0	13.4	100	43	72
SEP	10339	9974	10157	20.6	0	10.3	100	49	75
OCT	10365	9932	10149	17.9	-1.8	8.1	100	34	67
NOV	10385	9760	10073	15.5	-3.8	5.9	100	53	77
DEC	10372	9883	10128	13.3	-1.8	5.8	100	66	83

ELMDON (BIRMINGHAM)

YEAR / MONTH	PRESSURE mb			TEMPERATURE °C			HUMIDITY %		
	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.
1973									
JAN	10424	9858	10141	11.1	-3.7	3.7	100	53	77
FEB	10336	9755	10046	10.7	-7.4	1.7	100	48	74
MAR	10384	10004	10194	16.7	-5.8	5.5	100	30	65
APR	10319	9867	10093	16.6	-5.1	5.8	100	36	68
MAY	10281	9980	10131	22.0	-0.4	10.8	100	33	67
JUN	10349	10100	10225	25.8	1.9	13.9	100	28	64
JUL	10273	9963	10118	25.1	5.5	15.3	100	45	73
AUG	10293	9946	10120	29.0	5.1	17.1	100	27	64
SEP	10302	9913	10108	25.6	2.4	14.0	100	37	69
OCT	10361	9929	10145	17.7	-2.1	7.8	100	34	67
NOV	10357	9956	10157	15.6	-5.1	5.3	100	47	74
DEC	10384	9830	10107	12.0	-8.1	2.0	100	49	75
1974									
JAN	10333	9855	10094	12.7	-5.6	3.6	100	53	77
FEB	10368	9651	10010	13.5	-2.6	5.5	100	51	76
MAR	10303	9897	10100	15.8	-3.0	6.4	100	37	69
APR	10308	9963	10136	16.6	-2.2	7.2	100	34	67
MAY	10274	9963	10119	20.7	-0.3	10.2	97	33	65
JUN	10289	10006	10148	24.4	2.3	13.4	100	30	65
JUL	10253	10001	10127	24.2	5.9	15.1	99	37	68
AUG	10316	9989	10153	23.3	2.8	13.1	100	42	71
SEP	10296	9821	10059	21.0	-0.1	10.5	100	49	75
OCT	10272	9932	10102	13.2	-1.9	5.7	100	49	75
NOV	10318	9793	10056	13.3	-3.2	5.1	100	56	78
DEC	10425	9970	10198	15.7	-2.6	6.6	97	48	73

ELMDON (BIRMINGHAM)

YEAR / MONTH	PRESSURE mb			TEMPERATURE °C			HUMIDITY %		
	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.
1975									
JAN	10355	9869	10112	13.2	-3.0	5.1	100	53	77
FEB	10389	9988	10189	12.0	-4.7	3.7	100	62	81
MAR	10300	9944	10122	11.7	-4.7	3.5	100	49	75
APR	10339	9955	10147	20.7	-3.4	8.7	100	35	68
MAY	10365	10033	10199	21.5	-2.6	9.5	100	35	68
JUN	10321	9993	10157	27.2	1.2	14.2	100	22	61
JUL	10319	9997	10158	28.6	6.6	17.6	100	32	66
AUG	10306	10054	10180	32.3	7.1	19.7	100	29	65
SEP	10308	9838	10073	22.4	-1.3	10.6	100	41	71
OCT	10353	10011	10182	17.1	-2.7	7.2	100	45	73
NOV	10348	9881	10115	14.0	-4.6	4.7	100	51	75
DEC	10388	9849	10119	11.2	-4.8	3.2	100	50	75
197									
JAN									
FEB									
MAR									
APR									
MAY									
JUN									
JUL									
AUG									
SEP									
OCT									
NOV									
DEC									

ABBOTSINCH

YEAR — MONTH	PRESSURE mb			TEMPERATURE °C			HUMIDITY %		
	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.
1971									
JAN	10230	9686	9958	12.7	-6.8	3.0	100	53	77
FEB	10416	9713	10065	11.3	-4.6	3.4	100	59	80
MAR	10385	9849	10117	12.5	-3.2	4.7	100	41	71
APR	10336	9998	10167	18.3	-2.4	8.0	100	33	67
MAY	10233	9944	10089	19.7	-0.6	9.6	100	33	67
JUN	10291	9916	10104	20.2	2.5	11.4	97	37	67
JUL	10330	9987	10159	26.0	3.4	14.7	100	32	66
AUG	10237	9952	10095	23.5	5.8	14.7	100	40	70
SEP	10303	10004	10154	23.3	-1.9	10.7	100	42	71
OCT	10397	9900	10149	19.3	-4.2	7.6	100	38	69
NOV	10292	9901	10097	15.4	-5.1	5.2	100	44	72
DEC	10415	9856	10136	13.3	-2.5	5.4	100	57	79
1972									
JAN	10341	9830	10086	11.1	-7.2	2.0	99	57	78
FEB	10309	9753	10031	10.0	-5.8	2.1	100	49	75
MAR	10403	9746	10075	16.4	-4.8	5.8	100	47	74
APR	10347	9729	10038	15.6	-0.8	7.4	100	37	69
MAY	10267	9835	10051	17.3	0.8	9.1	100	37	69
JUN	10233	9937	10085	19.7	2.8	11.3	99	43	71
JUL	10310	9961	10136	27.2	6.3	16.8	100	44	72
AUG	10302	9884	10093	21.2	4.5	12.9	100	43	72
SEP	10343	10045	10194	23.3	-1.9	10.7	100	40	70
OCT	10407	9889	10148	18.8	-3.9	7.5	100	34	67
NOV	10377	9741	10059	14.5	-7.5	3.5	100	49	75
DEC	10322	9745	10034	12.8	-4.1	4.4	100	51	76

ABBOTSINCH

YEAR — MONTH	PRESSURE mb			TEMPERATURE °C			HUMIDITY %		
	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.
1973									
JAN	10416	9780	10098	11.2	-5.2	3.0	100	64	82
FEB	10295	9633	9964	11.5	-11.5	0.0	100	49	75
MAR	10364	9908	10136	14.7	-5.7	4.5	100	33	67
APR	10330	9939	10135	15.8	-4.0	5.9	100	27	64
MAY	10279	9908	10094	21.1	0.0	10.6	100	24	62
JUN	10329	9999	10164	22.5	2.7	12.6	100	35	68
JUL	10287	9976	10132	23.8	4.6	14.4	100	43	72
AUG	10297	9877	10087	26.5	5.2	15.9	100	43	72
SEP	10300	9886	10093	21.6	-0.1	10.8	100	43	72
OCT	10330	9975	10153	20.8	-4.2	8.3	100	39	70
NOV	10342	9913	10128	14.4	-10.4	2.0	100	42	71
DEC	10362	9794	10078	11.8	-12.4	-0.3	100	48	74
1974									
JAN	10270	9763	10017	11.4	-2.0	4.7	97	57	77
FEB	10344	9642	9993	11.0	-2.6	4.2	100	52	76
MAR	10304	9830	10067	15.4	-4.1	5.7	100	41	71
APR	10345	10004	10175	19.4	-2.5	8.5	100	34	67
MAY	10282	9917	10100	21.2	-1.9	9.7	100	32	66
JUN	10278	10008	10143	25.8	1.6	13.7	99	32	66
JUL	10229	9932	10081	19.4	5.6	12.5	99	35	67
AUG	10310	9967	10139	21.4	3.2	12.3	100	39	70
SEP	10276	9725	10001	16.9	-4.0	6.5	100	43	72
OCT	10276	9966	10121	13.8	-3.0	5.4	100	42	71
NOV	10294	9628	9961	12.7	-4.0	4.4	100	64	82
DEC	10361	9817	10089	12.8	-0.9	6.0	100	54	77

ABBOTSINCH

YEAR — MONTH	PRESSURE mb			TEMPERATURE °C			HUMIDITY %		
	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.
1975									
JAN	10277	9756	10017	12.2	-3.8	4.2	100	62	81
FEB	10372	9967	10170	11.6	-3.1	4.3	100	55	78
MAR	10308	9900	10104	11.0	-4.4	3.3	100	37	69
APR	10344	9918	10131	20.1	-2.4	8.9	100	29	65
MAY	10364	10017	10191	18.5	-2.3	8.1	99	14	57
JUN	10343	9951	10147	26.0	1.2	13.6	100	35	68
JUL	10319	9926	10123	25.8	5.3	15.6	100	31	66
AUG	10298	10003	10151	31.2	5.6	18.4	100	38	69
SEP	10259	9768	10014	21.1	-1.4	9.9	100	36	68
OCT	10349	9947	10148	16.5	-0.9	7.8	100	44	72
NOV	10366	9758	10062	12.8	-4.8	4.0	100	47	74
DEC	10338	9817	10078	11.8	-6.1	2.9	100	53	77
197									
JAN									
FEB									
MAR									
APR									
MAY									
JUN									
JUL									
AUG									
SEP									
OCT									
NOV									
DEC									

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