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***The Accessibility of UK Primary Medical Care:
Problems, Practice, and Potential***

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Doctor of Medicine (MD)

The University of Edinburgh

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Declaration

This thesis has been composed in its entirety by me for the purposes of submission for the degree of Doctor of Medicine, University of Edinburgh. The work undertaken is my own, unless (where acknowledged) it has been undertaken in collaboration with colleagues. The work described has not been submitted for any other degree, diploma or professional qualification.

Signed

BSc (Hons) MBChB MRCGP

The Accessibility of UK Primary Medical Care:

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Finally, to my father, Ian Campbell, who has encouraged and supported me throughout these years of study and in the undertaking of this exercise. It is to him I dedicate this work.

Abstract

This thesis addresses issues relating to the accessibility of primary medical care within the context of the National Health Service. A review of the literature is undertaken which identifies access as a key issue for patients, doctors, and health care planners. A basic framework using the geographical, organisational, and psycho-social elements of access to care is adopted for a detailed consideration of these distinct elements of accessibility.

Five studies are described. The first of these relates to the provision of out-of-hours care by five general practitioners in one practice in central Edinburgh. The association of reduced access (a completely booked appointment system) with an increase in subsequent out-of-hours workload is reported. A case study of upper respiratory illness presenting out-of-hours investigates the impact of doctors' choices made regarding the management of out-of-hours contacts on subsequent consultation patterns.

While the first study considered the operation of the appointment system as a factor influencing out-of-hours workload, the operation of a practice appointment system was studied in more detail in the second study. This work investigated the consequences of increasing appointment length on clinical workload, appointment system operation, patient "flow" (waiting and consultation times), and consultation and doctor behaviour. Changing from booking eight patients per hour to six patients per hour was associated with an increased matching between supply and demand for appointments, increased numbers of patients requiring to be fitted in as "extras", and reduced waiting time for patients seen under the new arrangements. Surgeries in which an undergraduate medical student was present were observed to be different from non-teaching surgeries with respect to a number of measures.

Variations in the operation of appointment systems have been judged by some to have important sequelae in the decisions made by patients as to where they might receive care. Such judgements form the basis for the central study of this thesis where the impact of varying doctor accessibility on the decision taken by patients to self refer to a hospital Accident and Emergency Department was investigated in nineteen of twenty six practices in the West Lothian district of Lothian Health Board, Scotland. Information was collected about practices and their appointment systems over an eight week period and a questionnaire survey of patients attending participating practices or the local Accident and Emergency Department was undertaken. This study highlighted the importance of distance from Accident and Emergency as a factor influencing the use of Accident and Emergency services, and also highlighted the importance of patients' perceptions of doctor availability as a contributing factor in patient's consulting behaviour. The relationship between patients' perceptions of doctor availability and practice list size was investigated using data obtained from the questionnaire survey of patients attending West Lothian practices during one week of 1994. Practices rather than patients formed the unit of analysis in this investigation where patients' perceptions of doctor availability were reported for urgent and non-urgent situations separately. A significant negative association between practice list size and the perceived availability of general practitioners is described and regression modelling used to investigate the association between patient satisfaction with doctor availability, patients' perceptions of doctor availability, and practice list size.

The final two studies describe the potential for using geographical information systems (GIS) technology in investigating the accessibility of primary care. Some of the features of GIS technology (mapping of geo-referenced information, construction of polygons, buffers and convex hulls, contour plotting and construction of spider maps) are demonstrated using data obtained from West Lothian as a case study. Plotting of polygons representing practice areas is used in the final study, which investigated the accessibility of general practitioners as, reflected in the size of their practice catchment areas. Using this approach, an association between quality of primary care and the size of practice catchment area is described and questions are posed regarding the lack of available guidance for general practitioners in relation to defining the size of the area in which they provide services.

Access to primary medical care requires a consideration of the quality of services to which access is being provided. Health service planners, doctors, and their patients must ensure that quality in relation to service delivery is matched by quality in relation to the arrangements by which that service is accessed. This work contributes to and informs that relationship.

Introduction

This thesis describes research carried out between 1989 and 1996, and reports on four studies undertaken in south-east Scotland and one in South London. The common theme running through all of these studies is the accessibility of community based medical care. This is explored within the context of UK general practice, and also at one interface between primary and secondary care - namely the A&E Department. The thesis provides an integrated exploration and analysis of factors influencing the accessibility of primary medical care. A comprehensive review of the literature identifies and explores the principal factors relating to the accessibility of primary medical care. The investigative work reported examines some of these factors and their relation to actual and reported accessibility in more detail. Whilst the theme of accessibility pervades each of the studies to be reported, other issues arose in the course of the research, and some of these have been investigated in more detail. I have reported on these findings as they occur. On a similar vein, literature deemed most relevant to a particular study is reviewed and discussed in the context of the study, rather than in the more general literature review undertaken in the first part of this thesis. In this regard for example, whilst the accessibility of out-of-hours care is of major importance to patients, relevant literature is commented on following a study examining issues relating to the accessibility of out-of-hours care rather than in the review of literature relating to 'accessibility' as a theme. The routes taken in accessing medical care by patients are complex and involve variables relating to both patients and doctors as well as administrative systems aimed at managing work load effectively. I have commented on a number of these variables throughout this thesis.

At the time this work was undertaken, I was employed in the University Departments of General Practice of the University of Edinburgh (initially) and latterly at the United Medical and Dental Schools of Guy's and St Thomas's Hospitals (UMDS). Both of these institutions have a history of substantial research interests in patterns of patient consultation (especially with regard to consultation length and surgery waiting times), and the implications, both personal and professional, of variations in general practitioners' behaviour. Research conducted by colleagues from these departments had demonstrated wide variations in doctor consulting styles (as reflected in consultation length for example) and behaviour (for example in relation to prescribing, referral, or health screening activities within the consultation). A

logical sequel of these observations was an attempt to define quality with regard to some of these measures, and a study was initiated in the Edinburgh department examining the relationships between quantity (workload), queuing (consultation dynamics) and quality. I have been glad to contribute to the follow up and development of the results of that work.

Questions were addressed relating to the behaviour of doctors, the management of time, and the definition of quality in relation to administrative arrangements in general practice. Not only are variations between doctors identified and investigated, but also substantial variations between the practices from and in which they operate are noted. Some of the implications of this inter-practice variability are reported in detail. One of the five studies involved collaboration with colleagues from the University of Edinburgh Department of Geography and the use of new methodology in the form of Geographical Information System (GIS) technology. Statistical analysis of results was undertaken where this was relevant and necessary for the meaningful interpretation of results.

The thesis is divided into five chapters. Presentation of each of the studies is preceded by a summary of the aims, setting, design and main findings of the study.

Chapter I reviews the current literature relating to the accessibility of primary medical care within the context of the United Kingdom's National Health Service. The importance of accessibility is highlighted in a service which is becoming 'primary care led', and the literature relating to the geographical, organisational, and psycho-social elements of accessibility are examined in detail.

Chapter II describes two investigations. The first of these is a descriptive study of the out-of-hours care provided by one medical centre. The study explores prospectively collected information to examine the accessibility of out-of-hours primary medical care, and the strategies used by doctors in the management of patients presenting out-of-hours. In particular, the association of variations in daytime appointment availability and out-of-hours workload is investigated. Having begun to examine issues relating to the operation of appointments systems, the second study uses an observational, before and after design to explore issues relating to the planning of an appointments system in general practice, and to report some of

the consequences of changing from an appointments system booking eight patients per hour, to one where patients were booked at the rate of six per hour.

Chapter III documents the central study of this thesis which comprises three related investigations using information obtained from practices and patients in West Lothian, Scotland. The principal hypothesis investigated is that systematic variations in the accessibility of general practice consultations are associated with variations in practices use of Accident and Emergency services. Practices thus formed the unit of analysis in this investigation where 18 out of the 26 practices in West Lothian contributed to a study examining their consulting arrangements and use of Accident and Emergency services. The first investigation describes the magnitude of variations between the study practices in the operation of consulting arrangements, and investigates the relationships between three practice measures: (i) practice appointment operation, (ii) patient's dissatisfaction with their practice's consultation arrangements (quantitatively assessed in a questionnaire survey of patients attending participating practices or the local A&E Department), and (iii) practice use of the local A&E Department at St John's Hospital situated in Livingston New Town. The second investigation reported used information from the patient questionnaire survey to investigate factors associated with variations in patients' perceptions of the availability of their general practitioner, and to explore the relationship between these perceptions and their perception of medical urgency using questionnaire data aggregated to practice level, perceptions of doctor availability amongst patients from practices of varying list size are also explored as part of this study. The final investigation in this chapter documents the development of a practice based model using regression analysis to consider factors influencing patients' perceptions of and dissatisfaction with doctor availability.

Chapter IV documents two studies investigating the accessibility of primary medical care using the technology of geographical information systems (GIS). The first investigation in this chapter used data from the study described in the previous chapter as the basis of a case study exploring the potential for this new methodology. Mapping of patient, practice, and hospital locations, and plotting of Thiessen polygons, convex hulls, and buffers highlighted issues relating to the accessibility of medical care and the use of Accident and Emergency services in West Lothian; these maps are presented to demonstrate some of the potential of this technology. Contour plotting of patients' perceptions of distance and travel time to their general

practitioner is undertaken, and reveals discrepancies between patients' perceptions of accessibility compared to measured geographical accessibility of services. Having undertaken a case study demonstrating some of the potential for the use of geographical information system technology in the definition of accessibility of primary care, the experimental use of geographical information technology is outlined in the final investigation of this thesis in which the issue of practice catchment area is examined for 60 practices located in central London. This important but neglected subject is explored, and some of the influences on, and associations of, variations in practice catchment area are investigated using data made available through the use of GIS technology.

Chapter V identifies some areas for further investigation, and draws together the work presented as a conclusion.

An extensive **reference list** is provided relating to academic publications and other reference works cited in the thesis. Two **appendices** are attached containing the quantitative instruments used to collect information from patients in the West Lothian studies. Throughout the text, tables, figures, and maps are presented with sequential numbering. The studies reported in this thesis have resulted in the publication of a number of **academic papers** in peer reviewed scientific journals of reference, and copies of these papers have been incorporated at the end of this work

Chapter I

Literature Review

1 Defining Access

"Accessible": within reach, approachable, easily comprehensible

Chambers Twentieth Century Dictionary

...so runs the definition encompassing the principle concepts to be examined in relation to the provision of primary medical care. And although much has been written regarding the accessibility of personal health services, this simple definition gives a reasonable basis for undertaking a consideration of the accessibility of primary medical care, and identifying some of the problems, current provision, and present practices in the United Kingdom.

1.1 An Historical Overview

Until 1948, much of the British population was deprived of ready availability of medical advice and help. Such provision as was available was patchy in distribution and to a considerable extent dependent on the mobilisation of those health services which could be generated through charitable motivation. The ravages of two world wars served to highlight the shortcomings of the limited health provision made available by the passage of the National Insurance Act of 1911. The 1911 Act reinforced the role of the general practitioner in the care of low paid male employees. Although not provided for directly, wives and families gained some security from the provision of sickness benefit paid to men at times of medical incapacity; coverage of women and children extended during the inter war years.

These years also saw large numbers of disabled men returning from the battlefield. The health care system of the time was patently unable to cope with the visible need, and it was because of this that the government commissioned the Beveridge report (1942) outlining its blueprint for a National Health Service.

1.2 Principles of National Health Service Provision

"The Government... want to ensure that in future every man, woman and child can rely on getting all the advice, treatment and care which they may need in matters of personal health; that what they get shall be the best medical and other facilities that are available; that getting these shall not depend on whether they can pay for them, or on any other factor irrelevant to real need"
(Ministry of Health, 1944)

These were admirable words, used by the post war government of Attlee/Bevan to introduce the most celebrated change in health care provision in this country. Until then, half of the population were reliant on "private arrangements" for the services of a personal medical advisor (Ministry of Health, 1944 Page 7). The new world of health care provision was to be comprehensive, of high quality, and independent of the ability to pay (collectivist) - and opposed by much of the medical profession of that time who were anxious about the implications of state control of medical care and loss of earnings, and who preferred to highlight instead the health of the people as primarily dependent on social and environmental conditions (British Medical Association, 1944).

A further important principle in the introduction of a National Health Service was outlined by Aneurin Bevan, then Minister of Health who argued for the achievement of ...

"...as nearly as possible a uniform standard of service for all - only with a national service can the state ensure that an equally good service is available everywhere." (Hansard, 1946)

The National Health Service Act thus made a wide range of medical services available to the population. The barrier of cost was removed for virtually all services - at its inception, the only charges paid for by patients were for dental treatment. Funding of the service was by National Insurance contributions (in existence since 1911) and "by the ordinary processes of central and local taxation." The role of the Secretary of State for Health in relation to the NHS has been described in 1946 (NHS Act 1946) and echoed in 1977 (Section 1 NHS Act 1977) as "promoting a comprehensive health service ... and for that purpose, securing the effective provision

of services in accordance with [these Acts].” From the outset, a principal objective of the NHS has been to make health services available to the population of the country on the basis of need, and irrespective of the ability to pay. The wider issue of access to health services was addressed by the Royal Commission on the NHS in 1979 who observed that ..

'...it is unrealistic to suppose that people in all parts of the United Kingdom can have equal ease of access to all services of an identical standard. Access to the highest standard of care will be limited by the numbers of those who can provide such care. There are parts of the country which are better or worse provided with services than others. We draw attention .. to the special problems of rural areas and declining urban areas .. Nonetheless, a fundamental purpose of a national health service must be equality of provision so far as this can be achieved without an unacceptable sacrifice of standards ..'

(Merrison, 1979)

1.3 The move to a primary care led NHS

Recent years have seen considerable advances in the capabilities of secondary care services but these are expensive in financial terms as a consequence of their hospital base, and in the costs incurred through availability of new and expensive treatments. Such services may be perceived as less personal, and in many situations less convenient for the patient. These and other factors have led to an ascendancy in recent years of the position of primary care within the health care delivery system in many countries including the UK where a 'primary care led NHS' has been a focus of much recent thinking by providers and consumers alike (Royal College of General Practitioners, 1996a). A recent review of the health care provision for the population of London identified that there had been under-development of primary care within London at the expense of over-provision in the secondary care sector (Tomlinson, 1992).

Primary health care has been defined (Ritchie, Jacob et al. 1981) as the services provided by a range of community based practitioners (doctors, dentists, district nurses, health visitors, pharmacists, chiropodists, opticians and community family planning services). Access to secondary (usually hospital based) services is controlled by primary care services, and the general medical practitioner (GP) has a pivotal role in this process. An extensive survey of access to primary health care concluded that despite potential obstacles, most people have easy access to primary

health care services (Ritchie et al. 1981). In particular, organisational arrangements (receptionists, appointments systems etc.) did not appear to be a hindrance to accessibility. A higher proportion of those reporting difficulty with access to primary health care were from rural areas, were elderly, or were from lower socio-economic grouping (reflecting some of the observations made earlier of differential health experience). Small population percentages, however, hide large numbers of individuals, and it should be noted that the 5-10% of informants in that survey who reported difficulty with access to primary health care nationally represent in excess of 2 million individuals.

Where nations have invested in a primary care led system, Starfield indicates that an overall lower cost of health, improved satisfaction and health levels, and lower medication use are encountered (Starfield, 1994a). Unlike secondary care, primary care is frequently perceived as representing first contact care of undifferentiated disease which is community based, non-specialised and easily accessible (Starfield, 1995; Foets, Berghmans et al. 1985), and access issues relating to primary care have recently been identified as central to the UK governments consideration of the future of primary care (Secretary of State for Health, 1996b) (along with quality of service, fairness, responsiveness and efficiency). The emphasis on prevention and the role of the referral system are characteristics of UK primary medical care associated with the gatekeeping role (Starfield, 1994b; Bertakis and Robbins, 1987) with its potential for cost containment.

In contrast with the provision of highly specialised retail services, Joseph and Phillips (1984) note that proximity to specialised health care facilities does not imply accessibility for the population. The modifying feature is the referral system characteristic of many health care systems whose basic premise is that 'those in need of health care are unable to gauge the precise nature of their need and the appropriate treatment' (Joseph and Phillips, 1984) - in these circumstances the assessment of need is often taken over by the primary level of health care. This assessment may not always be made by doctors - literature from Sweden suggests a role for experienced primary care nurses in this initial assessment (Andersson, Hallberg et al. 1995). Access to primary care in whatever form is therefore a critical factor for patients in accessing other parts of the health care system

1.4 Availability or Accessibility?

Previous work examining the provision of primary care has frequently used the terms "availability" and "accessibility" interchangeably (Wilkin, Hallam et al. 1987; Foets et al. 1985) and has been taken to include such issues as GP appointments systems and arrangements for seeing a doctor, use of home visits, out-of-hours arrangements, and (to a lesser extent), arrangements and ease of getting to doctors' premises. The GP contract of 1989 defined doctors' availability to patients in terms of weeks and hours in the year during which a GP is "available" to patients.

Arrangements for these criteria to be met in a manner agreed between the supervising authority and the doctor were set in place and allowed for these times to cover a period other than the five working days in a week or on a part-time (less than 26 hours) basis. Availability was taken to include periods when the doctor was consulting with or visiting patients, but not that element of time traditionally referred to as "on call" (Department of Health, 1989).

Joseph and Phillips (1984), addressing issues relating to the accessibility and utilisation of health care draw a helpful distinction between the availability and the accessibility of medical services and in doing so draw on a theme recognised by Penchansky and Thomas (1981) and others (Aday and Andersen, 1974) who have observed that 'accessibility is something besides the mere existence or availability of resources at any given time'. Supply of service (availability) is identified as a prerequisite for accessibility which in these terms is then of secondary importance. The availability of primary medical care is subject to professional and political constraints outside the immediate grasp of the person in the street - does the profession of medicine recognise the need for and value of primary medical care, and are governments prepared to allocate the necessary resources making such services available to the population? Some (Buetow, 1995; Donabedian, 1972) have questioned the definition of availability based on supply of service and instead choose to consider availability as 'referring to the relation between patients' wants or needs and the supply and distribution of services.' Inspection of this approach would seem to raise some problems - inclusion of a relative component within the definition would seem to be more indicative of the concept of equity in service provision rather than availability, and it is the intention of this thesis to remain with the simpler

definition.

Accessibility however is possibly of more direct relevance to the consumer of the service. Availability relates to the provision of the service; accessibility takes into consideration the opportunity cost for the user in availing themselves of the service provided - child screening services may be made available through the general practitioner, but if (s)he is to be found one and a half miles away and on the other side of a busy main road from the tower block in which the potential user lives, and where the vagaries of public transport systems may also have to be considered, then the availability of the service becomes of secondary importance to the accessibility issues raised. A similar situation has been reported in relation to non-attendance for cervical screening (Elkind, Eardley et al. 1989) where time and transport difficulties (two of a number of factors) might outweigh the perceived benefit of having a cervical smear taken (Gillam, 1991).

2 Components of Access

No clear consensual picture emerges when one examines the literature with a view to identifying the principal elements determining the accessibility of primary medical care. However, despite the tendency for authors to incorporate terms relevant to their own disciplines, some common themes do emerge and a model of accessibility can be established based on those themes.

Donabedian (1972) identified the importance of socio-organisational and geographical elements in contributing to the accessibility of medical services, the latter being further subdivided into locational and effective accessibility and representing such issues as opening hours and the cost implications for an individual using the service, the former representing issues of physical proximity. Socio-organisational factors are "those service attributes which could give rise to differential access to health care on the part of individuals or groups" - those based on cost of care have often been considered of primary importance (especially in literature derived from countries with fee-for-service arrangements). Both elements of geographical accessibility (locational and effective accessibility) may also be subject to cost of care constraints, and the interaction of economic and social factors

remains an area of considerable theoretical and practical significance. A useful distinction has been drawn (Birch and Abelson, 1993) between income based barriers (such as car or home ownership) and non-income based barriers with regard to health service utilisation; the latter has been further explored by Rosenberg and Hanlon (1996) who suggested that this related not only to race, religion, ethnicity, gender etc., but that these elements could be incorporated as a single variable - the health service environment - which they subdivided into six categories based on urban/rural status and population density. Using this approach, they examined the effects of the health service environment on uptake of general practitioner and specialist services, and concluded that 'as populations become more dispersed and rural, physician services become more limited in quantity, and where they are located, the use of emergency services and admission to hospital are likely to increase'.

Others have developed and refined this thinking - Penchansky and Thomas (1981) proposing five components of access in their theoretical framework: availability, accessibility, accommodation, affordability, and acceptability (Box 1). A

Box 1 Five dimensions of Access - the "fit" between the patient and the health care system.

Availability	- volume and type of services
Accessibility	- locational considerations
Accommodation	- organisation of resources
Affordability	- financial constraints
Acceptability	- attitudinal factors

After Penchansky and Thomas (1981)

medical sociological perspective from Belgium focused on psychological thresholds, financial constraints and medical supply evaluation (Foets et al. 1985). The inclusion of a 'socialisation hypothesis' in the latter study (the experiences of previous medical contact lowers the threshold for subsequent service usage) touches on a further and more neglected area of interest - the personal accessibility of doctor to patient in the setting of primary care, an issue that will be expanded on later.

Penchansky and Thomas's study (1981) from Rochester, New York, merits further

description as a carefully documented survey investigating five proposed dimensions of access. Access is considered as a "concept summarising the fit between the patient and the health care system." The questionnaire survey of General Motors' employees and their spouses was judged to support the identification of the five theoretical dimensions of access (Box 1) when considered in relation to patient satisfaction and so to demonstrate discriminant validity. Construct validity of the theoretical framework was investigated by regression modelling of 18 independent variables (all based on patient satisfaction with aspects of the health care delivery system) against summated ratings of the five theoretical dimensions. The results presented broadly supported the theoretical framework proposed, although the independent variables considered were rather poor at explaining the access dimensions of availability and acceptability. That study identified "accessibility" specifically with the locational elements in the patient/health care system equation - including such ideas as travel time, transportation, etc. This is a very specific taxonomy which has not generally been adopted by other authors in this field who have more frequently qualified this element of access as "geographical accessibility". Penchansky and Thomas (1981) concluded however that patients can and do distinguish among availability, accessibility, accommodation, affordability and acceptability as separate but overlapping dimensions of the concept of access and proposed that future research instruments should include a larger number of positively and negatively worded questions concerning attitudes towards the five dimensions of access than they had been able to incorporate in their study.

3 Is there a problem with access to UK primary health care?

Despite the introduction of a nationalised system of health care in 1946, there was a continuing increase in differentials between the social classes in mortality rates between 1930-32 and 1982-83 (Table 1).

Occupational class (Registrar General's classification)**		Men aged 15-64				
		1930-32	1949-53*	1959-63**	1970-72**	1979-80- 1982-83 [∞]
I	Professional	90	86	76	77	66
II	Managerial	94	92	81	81	76
III	Skilled manual and non-manual	97	101	100	104	102
IV	Partly skilled	102	104	103	114	116
V	Unskilled	111	118	143	137	165

*Corrected figures as published in Registrar General's Decennial Supplement England and Wales 1961: Occupational Mortality Tables

** Occupations in 1959-63 and 1970-72 reclassified according to the 1950 classification ∞ Great Britain, 20-64 age group

Table 1 Mortality (standardised mortality ratios) of adult men by occupational class (1930s-1980s). Modified after (Townsend, Davidson et al. 1992 Table 3.1 p 65 ; OPCS, 1986; OPCS, 1978)

It is evident that wide differentials existed (and indeed increased) between the mortality of men from different social classes between the 1930s and the early 1980s. Observations of this type made in the early 1970s led to the establishment in 1977 of a research working group chaired by Sir Douglas Black (Chief Scientist at the Department of Health and at that time President of the Royal College of Physicians). The remit of this group was to "assess the national and international evidence and draw some implications for policy from the evidence on inequalities in health". There was a recognition that despite an expensive nationalised system of health care, Britain had failed to maintain its position internationally with regard to infant mortality and secondly, that evidence was accumulating suggesting that wide differentials existed and persisted between the social classes with regard to mortality and morbidity - a sort of evolving inequality.

This working group reported in 1980. Thirty summarised points were made, along with 37 specific recommendations. In summary, its observations included a recognition of the poorer health experience of lower occupational groups at all stages of life and of the class gradient of health status which was greater than in some other comparable countries, and which was increasing. This poorer health experience of lower social groups was matched by a class-related differential in the use of health services. As far as general practice was concerned, this differential use related to both the rate and quality of consultations, and was associated with structural differences in the allocation of resources, especially at a sub-regional level (i.e. within regions and between neighbourhoods) - reflecting the inverse care law formulated by Tudor Hart (1971) who reviewed the then available evidence regarding the relationship between social class and health experience and distribution of health services before defining the inverse care law and the force (as he perceived it) which created and maintained it – the operation of the market in the arena of health care provision and distribution. His original observations continue to be widely cited in the literature, and have continued relevance for structuring the analysis of inequalities in access to publicly financed primary medical services free at the point of use.

Two main policy objectives were identified by the authors of the Black Report as potentially of importance in addressing the inequalities identified by the group: (a) A total approach to health problems was required - not simply a service orientated approach. (b) Fundamental change was required in the balance of activity and distribution of resources within the health system. Around this time, evidence was presented suggesting that general practitioners spent on average one-and-a-half times as long with patients from Social Class I compared with those patients from Social Class V (Buchan and Richardson, 1973); in recent years, some have suggested that differentials in relation to the allocation of time within the context of general practice reflect 'quality' of the service being delivered (Howie, Porter et al. 1989). Furthermore, Cartwright's work had identified differences between the social classes with regard to consultation rates (Cartwright and Anderson, 1981), quality of premises and content of the consultation (Cartwright and Marshall, 1965), practice list sizes and qualifications of doctors (Cartwright, 1964); in each instance the upper

social classes and groupings were favoured compared to the lower social groups. In a similar vein, an economic analysis of public expenditure on health care in England and Wales in 1972 identified that 'the upper two socioeconomic groups appeared to receive at least 40% more expenditure per person ill than the lower two' (Le Grand, 1978). Taking these observations together, there would appear to be an implication that patients from lower social classes might thus receive a poorer quality service compared with those from the higher social classes. Much of the responsibility for these problems was thought (by the authors of the Black Report) to lie outside of the health care delivery system, and relate more specifically to socio-economic factors operating amongst the population; although Le Grand suggested that organised health services may be seen as more accessible by higher social groups (Le Grand, 1978 p. 132), he was later to conclude that little could be done within the scope of the health service to reduce inequalities and that 'if greater equality of whatever kind is desired, it is necessary to reduce economic inequality' (Le Grand, 1982 p. 150).

The Black Report(1980), (initiated under a Labour Government) was rejected by the then (Conservative) Secretary of State for Health on grounds of cost and "effectiveness of such expenditure in dealing with the problems identified." More specifically, three alleged shortcomings of the report were identified: (a) An inadequate explanation of the causes of inequalities in health did not justify an "enormously expensive" programme of recommendations. (b) "Government and independent" evidence conflicted with the groups published observations with regard to the alleged poorer access of the working classes to the health services and (c) There was no evidence that spending the money would meet the objective of increasing peoples health. The "independent evidence" referred to was based on analysis of 1974 General Household Survey (GHS) data which had become available since the Black Report was published, and related specifically to equity in relation to access to primary care. The authors (Collins and Klein, 1980) concluded "that equity in terms of access [to the primary health care system] appears broadly to have been achieved.... The remaining variations are not systematically related to social class." The authors of this paper analysed the 1974 GHS data attempting to standardise for self reported morbidity (and so standardising for "need") before examining patterns of access - but this approach has been met with significant criticism of the

methodologies employed in the re-analysis (Townsend et al. 1992; Scott-Samuel, 1981). The criticisms levelled were three fold - there appeared to have been (a) failure to recognise the significance of multiple usage of the service within the sampling frame (b) lack of differentiation between discrepant "units of access" as measured by a yes/no response to a simple question. (c) uncertainty over the classification of morbidity, particularly with regard to identification of acute illness. These criticisms were substantial, and did not meet with a response from Collins and Klein.

In parallel with the observations of the Black Report, and in recognition that different areas have varying health needs, the government established the Resource Allocation Working Party (RAWP) with the aims of 'reducing progressively, and as far as is feasible, the disparities between the different parts of the country in terms of opportunity for access to health care for people at equal risk; taking into account measures of health needs, and social and environmental factors which may affect the need for health care.' (Ham, 1992) The ten years following the introduction of the RAWP's resource allocation formula did see a narrowing of the health expenditure difference between regions, but despite this, differentials of health experience have persisted.

As a sequel to the Black report, Dr Margaret Whitehead was invited by the then Director General of the Health Education Council to review the published literature from 1980 to 1992 on social inequalities in health in Great Britain, and to document promising initiatives taken to tackle the problem (Townsend et al. 1992). Despite a hope that the inequalities in health status described in the Black report might have lessened, the health divide once again documented considerable social and regional inequalities in health status and provision. Deprived areas were observed to have poorer availability of health services, and attention has been drawn to very low levels of accessibility in outlying local authority estates (Knox, 1979) compared to more affluent suburbs. The continuing differentials between and among groups of the UK population has continued to be reported in studies comparing the north and south of England (Phillimore, Beattie et al. 1994) and the east and west coasts of Scotland (Watt, 1996) and within parts of some cities (MacIntyre, Maciver et al. 1993). Differences are reflected not only in mortality and morbidity, but also within the

population by variation in satisfaction with important aspects of general practice service provision, and in the quality of care provided (measured in a wide variety of ways) - this will form an important part of the following discussion of the literature.

4 Framework for literature review

The determinants of the accessibility of primary medical care will be reviewed under the headings of geographical, organisational, and psycho-social factors. Accessibility as a theme is a dynamic concept, and interactions between these principal determinants will be considered in the course of the literature review (for example, the interaction of supply (organisational) factors and the observed geographical distribution of general practitioners). Such an approach is constructed from the perspective of a clinician, and the separate components are those of direct and immediate relevance to observed workload for general practitioners and the primary health care team.

It is a central argument of this thesis that accessibility of primary care includes issues relating to the personal accessibility of doctor to patient. On this basis, it is important to consider patients' perceptions and expectations of the doctor patient relationship, and patient satisfaction with the process and content of care as elements contributing to the concept of accessibility. Such an approach has been adopted previously and reported in the literature when Aday and Andersen (1974) suggest that 'accessibility is something besides the mere existence or availability of resources at any given time' and Penchansky and Thomas (1981) include the concept of 'acceptability' (incorporating attitudinal factors) as one of their five dimensions of access.

4.1 Geographical components

Geographical components contributing to the accessibility equation might include the three principal elements of distance, travel time, and transport but other factors that might be considered include the design of premises (particularly of interest to individuals with an identifiable handicap in the motor or visual modalities) and the siting of facilities relative to the population distribution.

4.1.1 Distance

The Terms and Conditions of service for general practitioners (Department of Health, 1989) places no restrictions on the size of the geographical area covered by practices. Limitations on the number of patients who may register with a doctor are in place, but restriction of the practice area has been seen as an infringement of the right of patients to register with any general practitioner who is prepared to accept them onto their practice list. As independent contractors to the NHS, general practitioners have jealously guarded those rights which have not (to date) been seriously challenged.

In exploring the distance effects on accessibility, researchers have often concentrated on service utilisation and patient satisfaction as proxy measures for accessibility. The idea that distance from a service may relate to the rate of utilisation of that service was first proposed in the mid 19th century by Jarvis who observed that 'the people in the vicinity of lunatic hospitals send more patients to them than those at a greater distance' (Shannon and Dever, 1974 p 111). More recently, and examining primary care, a study from Salford in 1985 (Whitehouse, 1985) highlighted a one third difference in consultation rates between patients living more than 2 ½ miles from a health centre compared with those living within two thirds of a mile; proximity appeared to be positively associated with service usage. This study confirmed the observations made previously in studies from London (Morrell, Gage et al. 1970) where the consultation rate of patients was noted to be inversely related to their distance from the surgery. Further analysis of data from this latter study (Table 2) highlighted the adverse effect of distance from the surgery on consultation rates amongst a variety of patient groups, but especially marked amongst older patients, especially older women. The effects of distance on health service utilisation has also been addressed by Knox (1979) who identified the deleterious effect on maternal and child health and morbidity of reduced antenatal care following inadequate consideration of distance effects in the siting of community obstetric facilities - examples of the 'inverse care law' expounded by Tudor Hart (1971).

	Overall	<0.25 miles	>0.625 miles	Ratio near:distant
Population Groups				
Whole population	4.82	5.07	3.53	1.4
Males	4.17	4.17	3.37	1.2
Females	5.40	5.89	3.67	1.6
Social class I and II	4.14	4.29	2.45	1.8
Social class III, IV V	4.88	5.14	3.63	1.4
Age Groups				
0-14 male	4.18	4.16	2.88	1.4
0-14 female	4.55	4.90	3.35	1.5
15-64 male	3.73	3.57	3.46	1.0
15-64 female	5.22	5.52	3.91	1.4
65+ male	7.08	8.20	3.86	2.1
65+ female	7.49	8.97	3.02	3.0

Table 2 Annual consultation rates by distance to surgery and age, sex and social class subgroups. (Modified after Parkin, 1979).

An important distinction has been drawn between the effects of distance on the selection by patients of sources of primary medical care, and attendance *rates* at those sources. Studies have suggested that attendance *rates* are adversely affected by distance in individual practices, although the decision on *place* of attendance may be much less adversely affected; Phillips (1980) was amongst the first to highlight the observation that a significant number of patients choose not to use the services offered at the nearest medical practice and it would appear that in these circumstances other factors should also be considered such as historical ties between doctor and patient. In that work, examining attendance patterns at four surgeries in South Wales, only 42% (Range 21-57%) of patients attended their nearest surgery. Surprisingly, "low status" respondents appeared to be able to express their choice for remote surgeries as a consequence of the availability of a relatively good public transport system which was thus identified as an important modifying variable in the accessibility equation.

Two more recent studies have identified the importance of distance in the process of selecting a general practitioner (Salisbury, 1989) and in the decision to change doctors whilst remaining at the same address (Billinghurst and Whitfield, 1993) - in both of these patient surveys, the distance from the practice was a key variable in the decision making process with patients favouring practices closer to their home address. Initially this might appear at odds with the work referred to in the previous paragraph, but Phillips work was based on results obtained through interviews with respondents from 'carefully chosen neighbourhoods' in South Wales whilst the other two studies were based on questionnaire surveys of patients who had recently registered with a new general practitioner in London (Salisbury, 1989) or who had changed doctors whilst remaining at the same address in Avon (Billinghurst and Whitfield, 1993). Methodological differences may thus account for some of the reported difference in conclusions regarding distance, but of more importance is the observation that the latter two studies related to the decision regarding registration rather than utilisation and uptake of service provision, and in this respect, these studies are actually addressing different research agendas.

Despite these observations, patient surveys have generally reported that the distance to their general practitioner is not regarded by patients as a significant adverse factor for most people in influencing the decision to consult. Research from Norway (Straume and Forsdahl, 1990) concluded that less than 10% of a sample of 3,500 patients reported that a long distance to travel was an obstacle to consulting a doctor and one large patient survey (Ritchie et al. 1981) carried out on behalf of the Department of Health concluded that for most people the primary health care services were accessible. This latter mentioned survey is of importance as being the single largest survey of the accessibility of primary health care undertaken in the United Kingdom and will be referred to on numerous occasions throughout this thesis. The work was commissioned by the Department of Health, and the sample survey was designed to be representative of adults living in private households in the United Kingdom in 1977. The Marchant-Blyth method (involving a complex, stratified, multi-stage design fully described in Appendix A of the report) was used to derive the sample. Interviews (averaging one and a quarter hours each) were conducted by OPCS field staff with 4,791 people contacted, representing 89% of the

5,373 eligible persons within the sampling frame. Information about the interviewees general practice was obtained following the interview, and was achieved for 4,525 (96%) of subjects interviewed. The sample achieved was shown to be broadly representative of the UK adult population of the time except that rather fewer young men and women and an excess of middle aged women were represented in the English sample, whereas in Scotland there appeared to be under-representation of young men and an excess of older men. In that study 90% of informants found the journey to the surgery easy and 50% lived within one mile of the surgery. Data from Aberdeen (Richardson, Howie et al. 1975) reported that 45% of patients lived within 1½ miles of their surgery; a study from Australia (Stimson, 1981a) found that 80% of patients of single handed practitioners in Adelaide lived within 2km (1.24 miles) of the practice, but that practices with several doctors had correspondingly larger catchment areas. These observations must be considered in the light of Hillman's suggestion (Hillman, 1973) of a maximum tolerable walking distance of only half a mile for elderly patients and for mothers with young children. Taken together, these observations suggest that large numbers of patients may be disadvantaged by their distance from their surgery.

In general then, distance from a provider facility would appear to have an adverse effect on service utilisation at that facility. Somewhat surprisingly, Smith and Yawn (1994) investigating patients who failed to keep appointments in Minneapolis identified that patients who had further to travel to a family practice facility had better rates of appointment keeping than those who had travelled shorter distances. Whilst these authors had investigated a number of patient characteristics as possible explanatory variables, it was not made clear in their report whether distance remained an independent predictor of non attendance after age, ethnicity, health care insurance status or other variables had been considered. The opposite effect was noted in one study of patient non-compliance with attendance at a psychiatry out patient department where non-attendance was associated with increasing distance from the hospital, and also with younger age, a history of missed appointments, or an appointment with a junior member of staff (Campbell, Staley et al. 1991). In view of these potentially conflicting results (although accepting that the studies were drawn from very different patient groups and clinical situations) one should treat the suggestion that non-attendance might be negatively associated with distance from

facility with considerable caution.

In conclusion, distance would appear to be an important factor in the decision made by patients as to where to register for primary medical care, but a factor which cannot be considered in isolation from other factors such as historical ties between doctor and patient which may prove to be of equal importance. With regard to utilisation of services, patients do not report distance as being of significance in the decision to attend for medical care, but studies suggest that a distance decay effect is in evidence and that the effect may be modified by other factors such as the availability of public transport.

4.1.2 Travel time

Much of the health services research literature accepts distance as a proxy representation of travel time. Few studies have addressed the issue of travel time *per se* as a potential influence in the pattern of service utilisation. Even an extensive survey (Ritchie et al. 1981) of the accessibility of UK primary care, although apparently asking about travel times to primary care facilities, did not report these findings and instead reported peoples' responses to a question on distance as the main measure of interest. Although a larger proportion of people used private transport to attend their general practice in 1977 compared with 1964 (Cartwright and Anderson, 1981), the proportion of patients reporting they could get to the surgery within 5 minutes fell from 29% to 23%. Whilst this might be a reflection of increasing traffic congestion, it is probably more likely to relate to a change in the patterns of service delivery, with a continuing move to centralisation of primary care services. Acton postulated distance as an important element in patterns of health care utilisation but identified that distance measured the additional effects of time, cost of travel etc. as well as the physical distance between patient and facility. Joseph (a leading medical geographer with an interest in the accessibility of health care) and Bantock (1982) proposed a measure of potential physical accessibility of general practitioner in Ontario based solely on distance - the apparent sophistication of their approach would appear to be undermined by the failure to recognise in it the importance of travel time factors. Also using a mathematical model, Stimson

(1981b) identified the effect of travel time in the opportunity cost to patients or families of using general practitioner services, and two studies by Acton from North America (Acton, 1973) highlighted the negative association between travel time and primary care service utilisation. The differential contribution of some of these factors have been investigated together, and some studies (Miner, 1978) suggest that people might attribute more weight to travel time than to mileage, or (where relevant) the financial cost incurred through using the service.

4.1.3 Transport

The 1991 census reported that 11.91m (24%) of 49.13m *persons* in England and Wales aged 17 and over did not own a car¹. In the second survey of patients and their doctors, Cartwright and Anderson (1981) reported that 42% of patients interviewed used private transport to attend the doctor compared with 23% in their 1964 survey (Cartwright, 1967). Whilst the Department of Health (DH) survey (Ritchie et al. 1981) reports a figure for use of private transport similar to the findings of Cartwright and Anderson's study (also carried out in 1977), the former study examined transportation factors in some detail and identified that 73% of patients living within 1 mile of the practice walked to the practice premises, and that the proportion of patients using a car to attend the doctor was directly related to the distance from the practice (Table 3).

¹ For 19.88m *households* in England and Wales in 1991, 6.44m (32%) did not own a car.

Usually goes to surgery	< 1 mile	1-2 miles	2-5 miles	5 miles or mor
By walking all the way	73	26	3	2
By public transport	3	24	32	15
By car	22	47	62	78
By other private transport	1	2	2	1
By other means (e.g. taxi)		1	1	3
Not known				1
Base: informants who had been to the surgery in the previous 5 years	1936	1045	765	177

Table 3: Means of transport usually used to get to the doctor's surgery, by distance from home (rural and non-rural areas) Figures are % of base. (After Ritchie et al. 1981 page 24.)

The DH study also reported the rather surprising finding that those patients reporting the journey to the general practitioner as easy were amongst the lowest users of the service, whilst those who said the journey was difficult were those who consulted most frequently - the suggestion was made (Ritchie et al. 1981) (p47) that it was people who suffer from ill health who both consult most frequently and who are liable to find the journey to the surgery difficult.

Although car ownership or availability is the norm amongst UK adults, the concept of a 'transport poor' was introduced (Wibberley, Cresswell, R.1978) consequent on the observation that age, sex, social class and rural location were important variables affecting variations in possession of a driving licence or car availability. One might expect that people from rural areas would be most disadvantaged with regard to access to primary care on account of transport difficulties, and there has been recent evidence that lack of transport is indeed an inhibiting factor in accessing care for such patients (Ryan and Birch, 1991). In developing countries, the concept of a transport poor has resulted in the attempted decentralisation of preventive primary care services aiming at reducing the 'friction distance' between provider and potential consumer caused by poor transport availability and low levels of personal mobility (Orubuloye and Oyeneye, 1982). In the UK, Cartwright and Anderson (1981) reported that patients in Social Class V had a 5 fold increase in home visiting rates

by general practitioners compared with patients from Social Class I, and suggested that this trend was related to the personal availability of private transport. They reported that 'both middle- and working-class patients were less likely to have a visit if they could go to the surgery by car and the differences between the middle- and working-class (in home visiting rates) disappeared if the comparison was made between those using the same method of transport' (Cartwright and Anderson, 1981). Similar observations have also been made by others subsequently (Wilkin et al. 1987).

Work from Manchester (Whitehouse, 1985) highlighted the association of transport difficulties with low use of primary care services, and in Edinburgh, Murray and colleagues (Murray, Tapson et al. 1994), investigating the health status of residents of Dumbiedykes, a geographically defined area of central Edinburgh, highlighted transport availability as an important restricting factor in the accessibility of local medical services. The introduction of a bus service improved access to surgery premises, and was welcomed by the local community. Although not investigated by these colleagues, it would perhaps have been of interest to consider primary care utilisation rates by Dumbiedykes residents before and after this service was introduced as a measure of the impact of the intervention undertaken. Research from North America has documented that transport availability may be an important influence on service usage patterns amongst children and their families (Margolis, Carey et al. 1995). In a study from the north of England, Cragg et al (1994) reported some of the differences between attenders or non-attenders at an out-of-hours primary care centre. Forty percent of the 1000 non-attenders questioned reported transport difficulties as a major factor in their decision, and these authors concluded that substantial cultural change would be necessary and careful planning undertaken if such centres were to provide a major part of out-of-hours care.

4.2 Organisational factors

Whilst Joseph & Phillips (1984) provided detailed examination of the accessibility and utilisation of health care, they paid less attention to the non geographical components of access than some other authors. Reference has already been made to Aday and Anderson's model of access to health care (Aday and Andersen, 1974), and using this model, three key determinants of access might be considered in relation to the organisation of primary care - the volume (number) of general practitioners available, their distribution, and the entry and structural barriers encountered by the users of the service.

4.2.1 Numbers of general practitioners

The changing balance of care has meant that there is an increasing demand for a regular supply of high quality vocationally trained general practitioners able to bring into being the "primary care led" NHS. In considering this however, one must consider the general practice workforce as a dynamic entity with positive and negative influences contributing to the final effect. The present situation, the influences affecting general practice workforce planning, and some of the actions presently being undertaken as a response to planning considerations are important facets of the problem.

4.2.1.1 Present situation

The UK currently has around 100,000 trained doctors providing care to 52 million members of the population. Of this, 26,700 (1995 figure (General Medical Services Committee of BMA, 1996)) are general practitioners providing unrestricted primary care - "general medical" - services. The terms and conditions of these self-employed physicians are set out by government and implemented by health authorities. It is the accessibility of these general practitioners which is the main subject of this thesis and it would seem reasonable to suggest that "more doctors provide greater aggregate access to care, and fewer doctors, lower aggregate access to care" (Joseph and Phillips, 1984). The 12% increase in the numbers of unrestricted principals occurring between 1984 (24,000 principals) and 1994 (26,700 principals) has led the NHS Executive to conclude that "there is little evidence of an inadequate supply of

general practitioners" (NHS Executive, 1996) and that there are sufficient general practitioner registrars in post to sustain numbers. Further evidence of this effect is presented by observations made in relation to the experiences of practices recruiting partners where (in 1994) 80% of practices advertising had recruited successfully, 26% of posts did not require re-advertisement, and posts attracted an average of 10 applicants each. In a detailed examination of the present workforce situation however, the BMA has concluded that the figures point to "a serious general practice recruitment problem which is expected to deteriorate further" (General Medical Services Committee of BMA, 1996), and although challenging some of the interpretation of the available information on general practice staffing and recruitment, there is a widespread recognition amongst the Department of Health, Royal College of General Practitioners, and the British Medical Association that should the trends for general practitioner recruitment continue, potentially significant effects on provision of general practitioner care are likely to be encountered.

The actual number of general practitioners required by the population has been the subject of detailed debate since the inception of the National Health Service. Space does not permit a review of the extensive literature on this subject but some of the main milestones in the debate have been summarised in detail by Butler (1980) and Butler and Calnan (1987). Opinions have varied over the years about the number of patients a general practitioner can, should, or might be expected to provide care for. The trend, however, is clear (Figure 1) - an actual reduction in average list size from 2,500 (1949) to 1,841 (1994) with significantly lower list sizes in Scotland than in the UK generally. An analysis of health care in 50 American States (Shi, 1992) highlighted a consistent relationship between the population adjusted numbers of primary care physicians and overall health levels as assessed by age adjusted and standardised mortality ratios - importantly, it is of note that this study accounted for some population variables and controlled for urban-rural differences, poverty rates, education and a range of lifestyle factors, suggesting that the health effects observed were in fact related to the supply of doctors rather than simply an artefact of analysis or biased sampling .

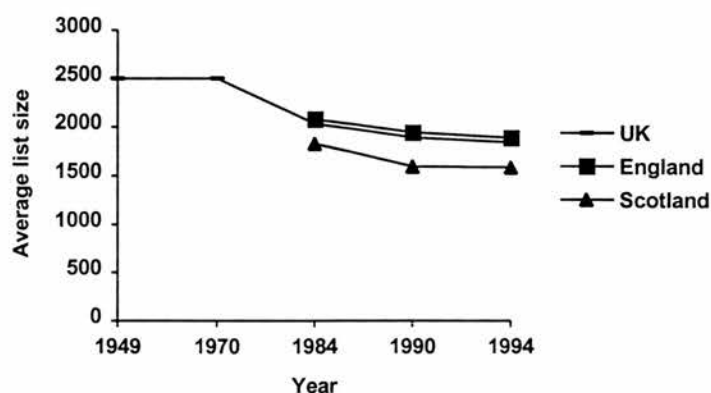


Figure 1 Average list size 1949-1994 UK, England and Scotland
(Royal College of General Practitioners, 1995b)

Significant factors contributing to the changes in list size over the years have been investigated over the years by the Medical Practice Committee (see page 57), the Gillie Committee(1963), the BMA in two charters for general practices (British Medical Association, 1965a), the Royal Commission on Medical Education - the Todd Commission (1968) and the various review bodies of doctors' and dentists' remuneration. Doctors themselves initially indicated an average list size of around 2,000 as the ideal, but as this has been achieved there has been a recognition that the move to a community based, primary care led NHS has led to an increased demand on community services and this has been paralleled by calls for a reduction in average list size to 1700. Despite recommendations to the contrary, the maximum list size permitted in the NHS has remained unchanged at 3,500 patients since 1952. The issue of list size will be returned to in the discussion of some of the studies presented in this thesis.

List size has frequently been investigated as a potential variable associated with variations in quality of care. The lack of conclusive results in this regard, however, was highlighted in the planning paper circulated prior to the introduction of the 1990 general practice contract. Research in relation to quality of care and list size has often

focused on the use of time in the consultation, and highlighted for example the association of small list sizes with longer average consultations (Andersson, Ferry et al. 1993; Howie et al. 1989) and with longer average booking intervals (Butler and Calnan, 1987). It is of some interest that similar conclusions have been reached in each of these studies despite varying methodologies. For example, Andersson's study examined the average consultation length of seven Swedish general practitioners (atypical in respect of increased academic commitments) seeing 463 consecutive patients. The methods of assessment of consultation time are poorly defined, and seem to relate to an estimate by the general practitioner concerned of consultation length; Andersson judges this methodology (apparently based on work carried out previously in the UK (Hull and Hull, 1984)) to have 'sufficient validity' without reporting data to substantiate the observation (Andersson et al. 1993 p 66). In contrast, the studies by Howie et al (1989), Wilkin and Metcalfe (1984), and Butler and Calnan (1987) are based on much larger sample sizes (11824 consultations by 85 doctors, 90,000 consultations by 201 doctors, and a questionnaire survey of 2,104 randomly selected general practitioners from England and Wales respectively). These studies were based in various parts of the UK; the first (from Lothian) involved the use of synchronised digital clocks to record patterns of flow amongst patients attending the general practitioner; in the second (from in and around Manchester), average consultation length was estimated on the basis of the recorded start and end times of consulting sessions and the number of patients seen, and the third involved the use of the appointment booking interval as a proxy measure for consultation length. Given the disparate methodologies employed in these various studies, it is of note that similar conclusions are drawn regarding the association of larger list sizes with shorter average consultation lengths. Intuitively, one would suggest that the more refined methodologies of Wilkin and Metcalfe (1984) and Howie et al (1989) are scientifically more sound, but this observation should be interpreted cautiously and before coming to a conclusion in this regard, it would be of importance and interest to obtain an estimate of the overall workload involved in undertaking these studies.

In addition to *consultation length*, Butler's monograph on this subject addresses the issue of list size through an examination of the relationship between list size and:

1. The total amount of time spent by general practitioners on patient care.
2. The average consultation rate.
3. The proportion of patients consulting annually.
4. The ratio of doctor : patient initiated consultations.
5. The content of care.
6. The overall quality of care delivered by the general practitioner. (Butler, 1980)

In this manner, Butler identified seven important areas, explored and reported in a “study of the economy of time and standards of care in general practice” (Butler and Calnan, 1987). Despite this intensive and extensive investigation, Butler’s most significant conclusion is perhaps a recognition that there is no “correct” list size - the issue rests on judgements made regarding optimal list size, sometimes in spite of rather than because of available evidence (Butler, 1980).

The assumption has been made that the case for smaller list sizes is “unanswerable” (House of Commons Social Services Committee, 1987), although Butler and Calnan’s work (Butler and Calnan, 1987) suggested that only a relatively small proportion of the time benefit obtained through smaller list sizes would actually be passed on to patients. In this thesis I shall report on the investigation of patients’ perception of doctor availability² in relation to the list sizes of the practices to which they belong - highlighting a further complication in considering list size, for this variable can usefully be examined as relating to the *average* for the practice taking into consideration the number of doctors available, or the *total* practice list size irrespective of the number of doctors. These two measures of list size reflect differing approaches to considering the general practitioner workforce, the former relating more to the numbers of doctors, the latter relating to their distribution (see later).

² This is a key area for investigation in this thesis (see ‘ Patient dissatisfaction with and perception of the arrangements for seeing a doctor in their practice’ page 101, section 4.3 and ‘Reported doctor availability in relation to practice list size and perceptions of medical urgency pp 101 - 101. The relevant literature is reviewed in the discussion of the investigative work.

4.2.1.2 Principal influences on numbers of general practitioners

A substantial literature exists with respect to the current general practice workforce situation. Some of the main influences are described below:

4.2.1.2 (a) Medical student numbers and undergraduate experience of general practice

Government plays a key role in controlling the supply of general practitioners through active management of the numbers of medical graduates. In line with the move to a primary care led NHS, the GMC has proposed, and is presently overseeing the implementation of policies aimed at reducing the burden of factual knowledge required by medical students. One of the principal recommendations of this report (reflecting earlier deliberations by the GMC (General Medical Council, 1991) and others (Towie, 1991)) is a greater emphasis during undergraduate clinical teaching on primary care and community medical services (General Medical Council Education Committee, 1993). The ability of university departments of general practice/primary care to respond to this increased demand for community based teaching has been explored by Higgs and Jones (1995) who in a position paper prepared on behalf of the Association of University Departments of General Practice reviewed the implications of the GMC policy on a wide range of stakeholders, and concluded that whilst 'opportunities existed for imaginative developments which may not occur again' it was unrealistic to expect that departments of general practice could sustain or deliver quality teaching without an increase in resources. These authors proposed that new funding streams were required to provide and develop the infrastructure of university departments of general practice. Despite this observation, Robinson et al (1994), following a questionnaire survey of the heads of departments of all 28 undergraduate departments of general practice in the UK (96% response rate), reported that by 1993 all departments were providing an undergraduate clinical attachment in general practice, and 22 provided pre-clinical teaching. Moves were afoot in all universities (except one where the changes had been anticipated and implemented prior to 1993) to increase the contribution of departments of general practice to the undergraduate curriculum

Although many universities are actively responding to the GMC recommendations, overall progress has been variable between regions. Undergraduate teaching of

general practice is frequently highly regarded by students (Oswald, 1993) but the experience in regard to subsequent perceptions of general practice as a career option has been less satisfactory. In a study from the University of Glasgow, Morrison and Murray (1996), examining influences on career choice amongst medical undergraduates, concluded that the substantially increased exposure to general practice in a cohort of medical undergraduates attending that university did not result in sustained changes in favour of general practice as a career option. The cohort study involved a three part questionnaire survey of 206 medical students undergoing their first clinical attachment before and immediately after undertaking a four week attachment in general practice. A follow up questionnaire was administered to the cohort at the end of their preregistration house office year. Although the most notable change observed in the study was an increase from 4% to 47% of students reporting general practice as one of their three most enjoyed subjects, an increase in the numbers of students citing general practice as a career choice after the attachment was transient, and was observed to be not sustained in the follow up survey. The initial favourable views on general practice appeared to have been influenced in part by negative selection rather than a positive career choice. Reasons given for changing towards general practice centered around a dislike for and disillusionment with aspects of hospital medicine, as well as the perceived lifestyle advantages of general practice. Whilst departments of general practice may not see themselves as a recruiting ground for the discipline, attitudes formed at medical school in response to learning experience and curriculum content are known to be potentially important considerations in career choice (Campos-Outcalt, Senf et al. 1995).

4.2.1.2 (b) Career choice of junior doctors

Whilst controlling the numbers of medical graduates may be a relatively straightforward process, government control of the balance of hospital specialists compared to the numbers of general practitioners is less readily effected. The medical profession and individual doctors remain autonomous with regard to career preferences and decisions. A recent, carefully conducted cohort study from Oxford (Lambert, Goldacre et al. 1996) examined the career choices of all 1993 UK medical graduates using a questionnaire survey (census) of doctors one year after qualification. A 72% response rate was achieved after an initial mailing and up to 3 reminders. Although a lower response rate (72%) was achieved in the 1993 survey compared with that from four previous cohorts surveyed in 1974 (83%), 1977 (84%), 1980 (83%), and 1983 (82%), the gender profile of respondents and non-respondents

was similar in each of these cohorts with a lower response rate from male doctors. Although this is a descriptive study and bearing in mind the observation regarding response rates, it seems reasonable to conclude from the methodology presented that the results reported are generalisable and relevant to current medical workforce planning. Compared with 45% of doctors surveyed in 1983 expressing a preference for a career in general practice, only 26% of 1993 graduates stated general practice was their first preference. Equivalent figures for hospital specialties were 62% (1983) and 71% (1993) and the authors concluded that their results 'show an increased lack of commitment to a medical career in the United Kingdom' and that a substantial shift away from general practice as a career choice had taken place in the decade. This conclusion is supported by the observation of a 20% fall in the numbers of general practitioners in training in the UK between 1985 (2,240 registrars) and 1995 (1,789 registrars) (Office of Health Economics, 1995), and by published (Savage and Vaughan, 1996) and anecdotal evidence presented to the UK Conference of Postgraduate Advisers for General Practice of serious problems in finding suitable applications for places on established vocational training schemes for general practitioners. The BMA report a 31% fall in the numbers of male general practitioner registrars, and a 4% increase in the number of female registrars who in 1994 comprised 55% of the total. Allen noted the problems of predicting final career choices from surveys of junior doctors. In her study of doctors four years after registration (Allen, 1994), only 55% were still in the same specialty they had chosen at registration and Allen challenged planners "assumptions still predicated on a medical workforce made up of men working full time mainly in one specialty for 40 years" as being "hopelessly misguided". Furthermore, no comfort can be drawn from work investigating the career intentions of those undertaking general practice vocational training. A recent anonymous postal questionnaire study (RowSELL, Morgan et al. 1995) investigating influences on career choices amongst 138 general practitioner registrars identified significant concerns and ambivalence regarding a career in general practice following completion of vocational training. A 73% response rate was obtained, with a higher response rate being achieved amongst women surveyed (47/54, 87%) compared with men (53/84, 63%). The authors however undertook the analysis of data and presentation of results relating to male and female registrars separately. Quantitative data was collected using Likert scales to assess the level of interest expressed by registrars in a number of aspects of general practice work. Significantly more men than women were interested in being

a full-time general practitioner principal, and most registrars were concerned that a market-led primary care system may not benefit patients or their general practitioners. The strength of the study was enhanced by the incorporation of qualitative methodology to identify consensus themes arising from free text responses made by respondents - concerns relating to the future of general practice as a clinical discipline, increased workload, increased out-of-hours work, and erosion of professional autonomy were identified as negative aspects of a general practice career compared to continuity of care and holistic approach to patient care which were seen as positive aspects of general practice. Rowsell et al (1995) correctly conclude that the results obtained do not necessarily provide the reasons for the fall in numbers of general practitioner registrars, but do provide data which may begin to explain why doctors who have already made some degree of choice about their career become uncertain when they experience its working reality.

4.2.1.2 (c) Changing work patterns

Between 1990 and 1994 there was a fall in the number of full time general practitioners from 95% to 88% of those holding unrestricted principal status (General Medical Services Committee of BMA, 1996). An extensive survey of general practitioner registrars (Rowsell et al. 1995) reported that 86% of women and 56% of men were interested or very interested in working less than full time. Medicine has not been exempt from the widespread social changes resulting in moves towards a shorter working week, a desire for earlier retirement, and a wish to protect or increase leisure time - the previously mentioned survey reported that 91% of registrars felt that time for leisure was important in making a career choice, and that this was rated of greater significance than on-call rotas, maternity leave, flexible working or any other factor identified. Taylor and Leese have identified the potential impact of changing work patterns on the medical workforce, and called for the issues of recruitment and retention to be carefully examined when considering medical manpower issues, not just the 'total numbers of general practitioners or net increase' (Taylor and Leese, 1997). Their work documented in detail the move towards part time working with an 18% reduction in the number of male full-time general practitioners between 1990 and 1994, and an even larger reduction (25%) in the number of women full-time general practitioners.

4.2.1.2 (d) *Contribution of non-UK doctors*

The NHS has traditionally relied heavily on the contribution of non-UK trained doctors to the medical workforce. Changes in immigration rules in 1985 however changed the situation with regard to non European nationals entering the UK and have resulted in a situation where it is anticipated that "recruitment of doctors from overseas will virtually halt in the near future" (General Medical Services Committee of BMA, 1996). Whilst the contribution of overseas graduates to NHS primary medical care (excluding Irish Republic graduates) remained constant between 1988 and 1992 at 21% of unrestricted principals, this is now an ageing population (44% of 3201 principals in England and Wales in 1993 being born outside the EU compared with 5% of principals aged under 35). As these doctors retire, it is likely that the effects on recruitment will be felt most in areas already hard pressed and ill equipped to cope with a doctor shortage where patient needs are high.

4.2.1.2 (e) *Gender profile*

The proportion of women general practitioners has increased from 22% (1988) to 28%(1994) reflecting the differential career preferences for general practice expressed by female medical graduates compared with their male colleagues (Lambert et al. 1996). Reference has already been made to the premium attached by women in general practice to non full-time employment, and this trend is likely to exacerbate the workforce implications.

4.2.1.3 Responses to present situation

Whilst not publicly accepting or acknowledging a "recruitment crisis", the Government have taken steps to examine issues of workforce planning for health care, and for general practice. In recent years, the Medical Workforce Standing Advisory Committee has been established, and issued three reports considering issues relating to medical recruitment and retention, and recommendations (Medical Workforce Standing Advisory Committee, 1995) proposing an increased intake to medical schools of 500 students (in addition to the current 4470 places) are being implemented with a view to completion by the year 2000. More recently, the

Advisory Group on Medical Education Training and Staffing (GP) was established to specifically consider issues relating to general practice recruitment.

General practice has been actively promoted as a career option in an attempt to address the changing balance referred to above. In London, where the issues of general practitioner recruitment and retention are acute, an extensive programme has been implemented (London Implementation Zone Educational Initiatives; LIZEI) aimed at providing educational incentives to general practitioners already working within the area of the London Implementation Zone as well as to those who might be attracted to work in this area. Promotional videos (Jones, 1996) have been produced to advertise the opportunities provided by such a location although similar approaches have been reported to have a negative effect on recruitment in the USA (Barclay, Lugo et al. 1994). Moves have been made to fill the shortfall of UK graduates to general practice by seeking to recruit non-UK medical graduates, and training schemes have been developed to provide extended professional development of young vocationally trained general practitioners in response to the view expressed by many new principals that their training did not adequately prepare them for the challenges of principal status.

A further promotion of general practice as a career option has taken place at an earlier stage on an experimental basis with the possibility of pre-registration house officers being offered the opportunity of experiencing some time in general practice (Porter, 1991) although legal obstacles may require to be addressed before such a scheme may be offered widely (Styles and Bogle, 1995).

Whilst there appears to be a need for an increased number of general practitioners, consideration has also been given to the role of nurses within primary care, and to the possibility of them having an extended role. Perhaps it is within the context of primary care in an Accident and Emergency setting that the role of the nurse practitioner has been most carefully examined, and nurse practitioners have been reported to have a successful role in the triage of Accident and Emergency attenders, and in the management of primary care problems and minor injuries (Heaney and Paxton, 1997; Dolan and Dale, 1997; Dale, 1992). This role has been extended to

the general practice setting (Rashid, Watts et al. 1996) and a successful experiment using practice nurses in the management of patients requesting a same day appointment has been undertaken in Northumbria (Marsh and Dawes, 1995). Their study involved the training of both a practice nurse in the diagnosing and treatment of minor illness before commencing consulting on her own, working up to a ten minute appointments system. Receptionists also required to be trained to offer a consultation with the trained nurse to patients requesting an urgent same day appointment. Eighty six percent (602) of 696 patients consulting in that experiment required no doctor contact, and 79% did not reconsult about that episode of illness. The authors concluded that trained nurses could diagnose and treat a large proportion of patients currently consulting general practitioners about minor illnesses. Although this is perhaps the key recent study of the extended role of the nurse within the context of primary care, the wider generalisability of the results obtained is limited by the limited range of outcome measures adopted for examination (restricted to an evaluation of the number of consultations which required a doctor contact, treatments undertaken, and rate of reconsultation). For example, no formal assessment of patient satisfaction with the process of care was undertaken, and no indication given of doctor initiated changes made to patient care following nurse consultations (for example changes in prescribing, or referrals or investigations initiated).

It would thus appear that the present problems in relation to general practice recruitment are multifactorial and relate to changes in the pattern of working (increased part time work, trends towards earlier retirement), the present gender profile of general practice with increased numbers of women, increased attractiveness of hospital based careers following implementation of the Calman proposals, an ageing (and retiring) non-European trained workforce which is not being replaced by non-European trained doctors, and a perceived increased workload in a primary care led NHS with less professional autonomy, new responsibilities, additional tasks, and heightened expectations from patients. Some of the problems may reflect wider changes in society, but whatever the cause, have resulted in specific responses from the medical and allied professions and from government.

4.2.2 Distribution of General Practitioners

4.2.2.1 The inner city, and regional variations

Availability precedes accessibility in the same way as provision precedes distribution, and in this respect an inadequate supply of general practitioners undermines equitable distribution of health care. Reference has already been made to the problems in distribution of general practitioners to “hard pressed” areas (page 48). A study of recruitment and relocation amongst Manchester general practitioners over a five year period, although reporting a 23% turnover, 6% mobility (12 moves per 100 practices in the study period) and 7% practice relocation, did not, however, highlight difficulties in inner city recruitment (to the surprise of local primary care administrators) (Smith and Barr, 1988). Smith and Barr’s work regarding changes in location of practitioners over a four-year period was based on the review of records from a variety of sources in Manchester. The recent conventional wisdom that financial incentives are needed to ensure that practising in the inner city offers equivalent attractions to elsewhere was challenged. The authors suggest that this did not appear to be the case for Manchester, where the availability of favourable working premises and conditions appeared to offset any potential disincentive to inner-city general practice. They suggest that ‘ the provision of facilities, and not financial incentives, is the best way to improve inner city general practice’. Their results tend to support the conclusions of Wilkin et al (1987) who suggested that “the stereotype of the inner city doctor seems to have little foundation in reality”, and Wyke has also challenged the stereotype of the inaccessible, poor quality inner city doctor using data obtained from studies of patients in two contrasting areas of Glasgow (Wyke, Campbell et al. 1992). Smith and Barr’s work was, however, carried out at a time of satisfactory recruitment to general practice, and it might be anticipated that the changes in recruitment referred to previously might now be adversely affecting the inner city preferentially. In support of this hypothesis, it may be of relevance to note that Lambeth, Southwark and Lewisham Health Authority, administering primary care in the United Kingdom’s most deprived inner city areas, report ongoing difficulties in recruiting general practitioners with 50 unfilled general practitioner principal posts in local practices (the highest number in the United Kingdom) despite a recent intensive programme of premises development (Lambeth Southwark and Lewisham Health Authority, 1995). A further study from London (Worrall, Rea et al. 1997) concluded that the workload penalty of working in the inner city was not offset by payments currently made to general practitioners in



recognition of the additional work generated through socio-economic disadvantage. Worrall et al attempted to cost the relation between socio-economic status and a number of measures of primary care workload using a retrospective analysis of data from manual and computerised datasets. Using recognised clinical labour costings the authors undertook an economic analysis of primary care costs resulting from consultations with a general practitioner, and of prescribing costs. Projected costs were related to socio-economic disadvantage amongst a random sample (572, 5%) of 12,014 subjects from one north London practice. Morbidity ('serious illness'), general practice workload, and costs per year all increased with decreasing social class for three social class groupings. The authors, - clearly aware of the limitations of small sample size, retrospective data collection, potential shortcomings in the assessment of social status, and the lack of information regarding the time or complexity of each consultation – concluded that deprivation payments made to the practice fell short of the true increase in workload costs and total costs (including prescribing). The latter measure is of importance since fundholding practices bear the costs of prescribing from within their fundholding budget, and thus it would not make economic sense for a practice in an area of high social disadvantage to consider the possibility of becoming fundholding using the argument that current deprivation payments might offset the additional cost of social disadvantage to the practice fund. The likely adverse effect on recruitment and retention to inner city practice was highlighted, and similar conclusions have been drawn from other work examining the distribution of general practitioners in relation to the needs of the population served (Benzeval and Judge, 1996) which identified inequalities of access and called for a redistribution of general practitioners to reflect the needs profile of the population.

In a similar vein, wide differentials are known to exist between regions in the numbers of doctors per capita - reflected in the proportion of general practitioners with large list sizes (Table 4) . An increase in the number of general practitioners was reflected in the overall reduction in the numbers of large lists between 1966 and 1976, but it is of interest that the relative position of regions was largely unaltered (with one exception) over the decade in question.

Region	1966		1976	
	%	Rank	%	Rank
North	51	4	47	6
Yorkshire/Humberside	53	5	44	5
East Midlands	59	7	49	8
East Anglia	37	2	29	2
South East	47	3	37	3
South West	29	1	24	1
West Midlands	61	8	43	4
North West	55	6	48	7

Table 4 Regional variations in primary health care in England: % general practitioners with list sizes of more than 2,500 persons. (after Phillips in Joseph and Phillips, 1984)

4.2.2.2 Variables

Unlike the control of the supply side of the equation, the distribution of general practitioners is subject to a large number of variables with important personal behavioural elements arising from freedom of doctor choice. Such variables are not subject to the same planning constraints as controls of graduate numbers.

4.2.2.2 (a) Ecological approach

The observation by Marden that the main correlate of doctor distribution is population size reflects an ecological approach (Rees Lewis and Williamson, 1995) to the examination of doctor distribution which uses correlation and regression analyses as important tools to identify contributing variables in the distribution equation. This approach has highlighted the significance of social factors as important co-variates in the equation examining the distribution of doctors. In Adelaide access to general practitioner services was found to vary with the status of the geographical neighbourhood being considered – an example of the “inverse care law” - and the association was more marked when practice opening hours were taken into consideration. Knox also reported a similar effect following an examination of

access to primary care in Scottish cities (Knox, 1978) but noted that “core services” were well provided for irrespective of neighbourhood social status. He subsequently suggested (Knox, 1979) that this apparently satisfactory situation was illusory if the quality of the service being delivered was taken into account. Newhouse et al (1982) identified that in the US system of healthcare, competitive market forces were important determinants of both specialist and family practitioner distribution. In that study, the re-distribution of doctors was observed to relate to the size of the population served. It is difficult to equate the results of such US studies directly to a UK setting, although Newhouse et al also identified the importance of local amenities and the attractiveness of towns as contributing factors in doctor distribution.

4.2.2.2 (b) Behavioural approach

In contrast with the ecological approach, a behavioural approach to the issue of doctors’ locational preferences starts with a consideration of the influences affecting the individual, or the system in which they operate. One of the earliest studies (Butler and Knight, 1975) examining the decisions taken by general practitioners regarding their location of practice was carried out against the background of the introduction of an inducement payment to doctors to establish practices in “designated areas” (see later page 57). These researchers reported on the responses of a 10% sample (2,031) of all English general practitioners to two questions on locational preference. In keeping with the observations made previously (section 4.2.2.1 page 51 et seq) it appeared that financial incentives and inducements were unlikely to influence the locational preferences of general practitioners which were much more likely to be influenced by perceived lack of choice or chance (28%) or by the influence of medical contacts (26%) or family or friends (18%). Only 8% of the sample reported that financial considerations were of importance. Although conducted some years ago, this study (with an 85% response rate to the questionnaire survey) remains the most comprehensive work conducted in recent years regarding the influences on locational decisions expressed by general practitioners.

In a follow up to this work, Knox and Pacione (1980) investigated the reported influences on choice of work location by students from the Universities of Dundee and Glasgow. Again, financial considerations appeared of little importance compared to the substantial influences of a professional or personal nature (such as the

availability of routine investigations to general practitioners, or living in proximity to family). Knox and Pacione's work did however, report a "constant avoidance of the inner city and of public housing areas" as preferred locations for practice. One study (Carlisle and Johnstone, 1996) examined the factors influencing the response to advertisements for general practice vacancies through the use of a postal questionnaire census survey of all 489 practices advertising to fill a partnership vacancy during a four month period in early 1995. Comparison of success in recruitment was made with the social status of practice populations as measured by the numbers of patients attracting deprivation payments. On the basis that the 32 practices with the highest proportion of deprivation attracted only half as many applicants as practices with a more affluent population of patients, the authors suggested that recruitment of general practitioners was hardest in areas with the greatest health needs stating that "the relative reluctance of applicants to apply to deprived practices may be a reflection on the areas in which doctors wish to live, rather than a direct consequence of working conditions in such practices". (Carlisle and Johnstone, 1996). Although initially appearing at odds with the observations regarding recruitment to inner city practice previously (page 51), it is important to note that Carlisle and Johnstone's study was carried out at a time of recruitment difficulties in general practice, and thus methodological differences may account for this difference in perspective. Although some innovative schemes from London have been reported as successful in challenging inner city recruitment problems (Savage and Vaughan, 1996), it seems likely that the locational preferences expressed by doctors may continue to disadvantage inner city populations with regard to access to high quality primary medical care, especially at times of leanness with regard to general practice recruitment. Evidence presented however suggests that the disadvantage to patients is not necessarily inevitable, and historical patterns of locational decision making by general practitioners might be challenged by initiatives with regard to facilities and education.

4.2.2.3 Centralising services - the issue of premises

One further influence on general practitioner location has been effected through the control and availability of practice premises. The 1960 Charter for general practice (British Medical Association, 1965b) introduced a major change in thinking regarding practice premises with the promotion of health centres providing accommodation for partnerships of general practitioners working as part of multidisciplinary teams. Following the Charter, there was been an increase in the

number of health centres in England from 28(1965) to 1320(1989) (Ham, 1992) and the increase was matched by an increase in the numbers of doctors working in group practices and a decline in the numbers of solo or 2 doctor practices (Table 5). The move to larger group practices has been made despite the recommendation of the Black Report (Black, 1980) in considering the problems of early primary care intervention in families that 'teams should be constructed on the basis of two and at most three general practitioners'. Wide variation exists between practice in the quality of the premises they occupy, and this problem is particularly acute in inner London where in 1992 46% of practices had premises below a nationally recognised minimum standard compared to 9% of practices in outer London and 7% in England overall (Jarman and Bosanquet, 1992). It is believed that recent initiatives relating to the London Implementation Zone may have addressed this problem to some extent, but much remains to be done in this regard.

Number of doctors in practice	1964	1974	1984	1994
<3	10921	4632	6792	6468
3-5	7457	10644	12881	13193
>=6	588	1643	3967	6906
Total	18978	20219	23640	26567

Table 5 Unrestricted general practitioners: Number of general practitioners in varying sized practices (England 1964-1994) (Department of Health, UK Government Statistical Service 1995)

The impact of this centralising of primary care services has been investigated in South Wales (Phillips and Williams, 1984) where the process has been described as 'extensive and swift' (Joseph and Phillips, 1984). Few studies have however reported on the impact on patients' perceptions of general practitioner accessibility of this policy. A notable exception was Baker and Streatfield's recent work from 89 practices in the South Western Health Authority area (Baker and Streatfield, 1995). The questionnaire survey of 16,000 patients highlighted the association of patient satisfaction with smaller practice list size. Whilst recent years have continued to see

a growth in the number of group practices (some health authorities have been explicit in their policy of withdrawing support from single handed practices (Ham, Hunter et al. 1995; Lambeth Southwark and Lewisham Health Authority, 1995) notes that current government policy has moved in favour of primary health care teams working from premises owned by the doctors themselves - much in line with the policy of privatising health estate management (NHS Estates, 1997).

4.2.2.4 Medical Practices Committee

A final and important influence on general practitioner distribution should be mentioned - the Medical Practices Committee (MPC). This body was brought into being at the start of the National Health Service and charged "to secure that the number of medical practitioners undertaking to provide general medical services .. in defined areas .. is adequate" (1946 NHS Act 34(2)). Areas were initially classed as "needy", "open", "doubtful", or "closed" on the basis of average list size, with a "needy" area having an average list size in excess of 3,000 per general practitioner. In 1952, revised procedures were used by the MPC to define practices in "designated areas" as having an average list in excess of 2,500 patients and in 1965 a designated practice allowance was introduced to attract doctors to such areas by easing the financial burden of establishing a practice in these areas. By this means, the MPC addresses not only the issue of the number of doctors, but also their spatial distribution. The MPC cannot direct doctors to work in a given area, and its effect is therefore largely mediated through its negative controlling power in restricting the number of general practitioners operating in areas which may be classed as "over doctored".

Joseph and Phillips (1984), commenting on the personal and professional influences on general practitioner location identify the conflict between the "professionalisation" of general practice with its associated maximising of the personal and professional well being of the individual *as opposed to* the greater good of society - in this regard "individual doctors may make locational decisions that may impair the effective delivery of a key service". Whatever the influences, the locational preferences expressed by doctors within the present system appear to have

contributed to the situation described previously where wide differentials exist between and within regions in the nature and distribution of high quality general practice, to the disadvantage (most notably) of inner city populations.

4.2.3 Practice Administration

General practice in the UK emerged from the disorganised and disillusioned state of the 1950's (Collings, 1950) as a sophisticated service whose practitioners regarded themselves as having a unique professional identity (Royal College of General Practitioners, 1996b; Stott, 1994; Armstrong, 1985). Butler and Calnan (Butler and Calnan, 1987) describe the evolution of the process by which this professional image has been acquired but argue that the effects of the general practitioner charter of 1965 "have been more visible in the organisation and processes of general practice than in the content or outcome of the encounters between general practitioners and their patients". Their argument is backed up by evidence extracted from Cartwright and Anderson's two surveys of patients (Cartwright and Anderson, 1981; Cartwright, 1967) and their observation that "the main picture is of quite major changes in the organisation of the general practice service alongside small and mainly insignificant changes in the basic relationship between patient and doctor". These early changes in the organisation and administration of the general practitioner service have continued in recent years. Following the introduction of the purchaser provider split in health care delivery (1990) and the rise in GP fundholding, there has been a requirement for increasing refinement of practice administrative systems. Based on practice surveys, the Royal College of General Practitioners report that the numbers of personnel involved in practice administration has risen (from 51,706 full time equivalents in 1991 to 57,020 full time equivalents in 1994 (Royal College of General Practitioners, 1995a) as has the use of technology to support practice activities. From a baseline figure of 10% in 1987, 79% of practices were computerised by 1993, with a projection of 92% of practices by 1997 (Leese and Bosanquet, 1995b; NHS Executive, 1993).

Central to a consideration of the accessibility of primary medical care are three important areas of practice administration: the use of appointments systems, the use

of the telephone, and the role of the receptionist in general practice/primary care. These issues are explored in detail throughout this thesis, but some of the main points will be highlighted here.

4.2.3.1 Appointments systems in General Practice

From 2% of practices operating appointments systems in 1951 (Royal College of General Practitioners, 1975), the years following the introduction of the Charter in 1965 saw a burgeoning in the use of appointments systems. Ritchie's study of access (1981) (see page 33) reported that 27% of patients were from practices with no appointments system and that 65% of the sample reported having appointment only arrangements. Ten years later, in a survey from north west England of 793 randomly selected patients from a large number of practices (Allen, Leavey et al. 1988), 72% reported they always needed an appointment when consulting, 17% had no appointments system in their practice, and in 9% prevailing circumstances dictated the consulting arrangements. Considerable variation existed between the 7 districts surveyed with a range of 4-53% of respondents stating that their practice had open access systems. Few other studies have examined the range of appointments systems offered across geographically defined areas. Appointments systems may be seen not only as a means of organising work, but also as one of the non-economic means of controlling patient access to medical care (Arber and Sawyer, 1982; Aday, 1975) with one study reporting that 21% of younger patients had put off seeing the doctor because of the need for an appointment (Cartwright and Anderson, 1981) although it has been suggested that this effect may be greater in practices with no appointments system (Wilkin et al. 1987). The 'approachability' of family practice consultations has been investigated as a function of the ability to make an appointment, and as a perception of whether the general practitioner is open and approachable (Hackett and Jacobson, 1995) - the former relating to the operation of appointments systems, and the latter a reflection of the doctor-patient relationship (discussed in the following chapter). Both aspects may be considered as components of overall accessibility.

4.2.3.1 (a) Booking arrangements

Various types of booking arrangements for seeing patients have been described - from complete open access (no booked appointments) to appointment only systems. Ridsdill Smith (1983) has described three principal appointment booking systems -

sequential, limited block and block release, and the use of modified block scheduling has been explored in non primary care settings (Popa, 1993). Practices may combine approaches (Taylor, 1984) and this has been commended as an ideal by some researchers (Allen et al. 1988). Much of the work carried out examining appointments systems in general practice has been observational in nature, examining the effects of adjustments in appointment operation in only one practice, or even on some doctors or some consulting sessions within a practice (Wilson, 1989; Ridsdale, Carruthers et al. 1989). An effect on the operation of appointments systems is effected through the use of doctor as well as patient initiated appointments, and it is known that different doctors will initiate return appointments in a widely disparate manner. Such an approach may be used by doctors to 'buy time' in the midst of busy schedules (Morrell et al. 1970) and practices with longer appointments have been reported to have fewer return visits, whether initiated by doctors or patients (Hughes, 1983). In Hughes study, two practices in the same South Wales town were compared with regard to consultation outcomes. The two practices studied were selected because of known differences which existed between them regarding their appointments system and consultation arrangements. The first practice examined ('A') offered appointments of 10 minutes duration, had an average consultation length of 8min 4sec on direct timing of consultations over 12 surgery sessions during a four week period, issued prescriptions at 45% of consultations, and had a reconsultation rate within four weeks of the original consultation of 7.2%. This was in contrast with the other practice ('B') offering five minute appointment intervals, and achieving an average of 5min 18 sec consultation length, 63% prescribing, and 13% re-consultation. Whilst acknowledging the limitations of this (pilot) study, the authors suggest a causal relationship between length of consultation and frequency of prescribing or reconsultation, and called for 'further investigation of the implications of differences in outcome .. for other aspects of practice organisation'. Hughes suggestion that '... given the initial problem of establishing whether any association exists between consultation length and outcome, and the fact of the endless variability of the general practice situation, concern with exhaustive matching of practices in every respect seems less important than replication of research in a number of broadly comparable settings' initially appears to be a sensible and pragmatic approach to considering differences between practices in respect of consulting arrangements. Having said this, it is not clear from Hughes paper exactly which consulting sessions were used for the purposes of timing of

appointments, and furthermore, his observation that the two surgeries differed in respect of the 'quite large' numbers of patients seen outside of the appointments system would suggest that considerable caution should be exercised in accepting their conclusions. If (for example) the sessions used for timing consultation length included significant differences in the proportions of 'emergency' patients fitted into the appointments system as 'extras', one might expect this to significantly influence the overall average consultation length for these sessions. Hughes makes no reference to the numbers of emergency patients actually seen at these sessions, and only indirectly refers to the morbidity profile of patients seen, and so it would not seem reasonable to accept the results and conclusions of this work uncritically. Although the two practices operate in the same environment, no reference was made to differences which might exist in the socio-demographic or socio-economic makeup of the practice list, and since more affluent patients are known to have longer consultations than poorer patients (Cartwright and Anderson, 1981; Cartwright, 1967), this would be a potentially important variable to consider in accounting for the differences they observed in consultation length. Practice organisation tends to be peculiar to the practice, and on this account also it is not clear to what extent results obtained from such studies are generalisable to other situations.

To aid discussion on the introduction of an appointments system in one inner city practice with 7,600 patients, Fallon et al (1990) undertook two surveys of patients and staff, firstly regarding attitudes to appointments systems, and secondly in relation to the operation of the system already in place. Following a 96% response rate, nearly three quarters of the patients surveyed reported not favouring appointments systems, and 24% reported that they would consider leaving the practice should such a system be introduced! This was in contrast with the views expressed by staff in the practice who reported both advantages and disadvantages in such an arrangement – appointments systems were seen as giving staff more control over consulting but as less flexible for the patient. The issue of 'whose needs count?' is raised by Fallon et al, with a recognition of the primacy of the patients views, and of the need for consumer responsiveness which had been emphasised in some of the papers on health care (Secretaries of State for Social Services (UK), 1986) which preceded the introduction of the 1990 general practice contract.

4.2.3.1 (b) *Computer v Manual systems*

Appointments systems in the UK have traditionally been manually operated and paper based using materials supplied free to practices by Lloyd-Hamol³ (Royal College of General Practitioners, 1975). The recent rise in the use of computers by general practitioners has not (to date) been accompanied by a dramatic rise in the use of computerised appointments systems - figures from 1993 identify patient registration, repeat prescribing and patient recall as the three principal uses of computers at present. More sophisticated uses for practice computers are being explored in the UK and elsewhere (Shahabudin, Almashoor et al. 1994) but little information is available on the use of computerised appointments systems - the 'last frontier' of primary care computing (Putney, 1989).

4.2.3.1 (c) *Overall provision*

Fundamental to an examination of the impact of appointments systems on the accessibility of primary medical care is a recognition of an existing relationship between the supply of consulting time in a practice (the product of the number of appointments provided and the appointment interval) and the demand for consulting time (the product of consultation rates and consultation length). It is not clear how the components of this equation interact or inter-relate, and a recent series of short articles proposed a number of 'solutions' aimed at educating patients in an attempt to reduce demand (Browne, 1997). Furthermore, one should be aware of another consideration - that of the relative contributions of expressed and unexpressed need as potential influences on the demand for consultations. Expressed need is (in this context) converted to a demand for a consultation whilst unexpressed need may be managed by the patient using a number of alternative pathways including self-care, or care/advice obtained from family/friends or other health professionals or alternative health practitioners. Hannay (1979) described the iceberg of disease, but it is not clear what are the important variables in determining the proportion of the iceberg above water. In particular, the effect of modifying the supply of consultation time on subsequent patterns of demand remains to be defined. This aspect of

³ Lloyd Hamol (Batley, West Yorkshire) are a stationery distribution agency supplying appointment booking sheets for manual appointments systems free of charge to the medical profession.

appointment operation will be considered in detail during discussion of some of the work presented in this thesis.

In the absence of clear guidance for the operation of general practice appointments systems, standards based on historical usage have been proposed. Using this approach, Stevenson (in

- The doctor is available at specified times for surgery consultations and telephone advice
- The system for monitoring appointments can identify and correct significant delays
- For urgent matters the patient is able to see their own doctor, partner or deputy at the next surgery, or speak to the duty doctor
- For routine matters the patient is usually offered the opportunity to see the doctor of their choice within a period set by the practice and published to the patients

Box 2 RCGP guidelines on general practitioner accessibility (Royal College of General Practitioners, Royal College of General Practitioners 1987)

Royal College of General Practitioners, 1975) proposed two methods for calculating the requirement for appointment time based on the number of patients (1.25 hours per 200 patients per week) or the number of doctors (estimating a relatively constant workload of around 8000 consultations per year). Stevenson acknowledged these were 'rough, initial calculation' based on available evidence of workload. It would appear that there was no attempt to match them against any quality standards other than empirical and anecdotal evidence of difficulties within the appointments system. Standards relating to appointment delay - the length of time before an appointment can be given, surgery waiting time, or patient satisfaction have been investigated (Butler and Calnan, 1987; NW Faculty of RCGP, 1986) based on doctors' or patients' perceptions of availability, and the Royal College of General Practitioners fellowship by assessment programme has proposed guidelines for general practitioner accessibility using practice based and auditable criteria (Box 2).

Fischbacher and Robertson (1986) undertook an audit of overall appointment provision in relation to consultation demand expressed by patients in one practice in Springburn, Glasgow. The study period was a consecutive four week period in early April 1984 during which details of appointment requests were recorded by reception staff using a standard proforma. The doctors opinion of the urgency of the request was recorded following the consultation using one of three categories for urgency. An interesting variation in the availability of 'same day' appointments is recorded

during the week, with Mondays having nearly five times as many available 'same day appointments as Fridays'. Despite offering appointments for the same or the next day in 90% of cases, it is of some interest that only 60% of patients actually took up this offer. Considerable numbers of patients were prepared to delay their appointment in order to wait for a particular doctor or time of day or both, although it was observed that (as in other studies (Sawyer and Arber, 1982)) this was considerably more true of patients making a request for a non-urgent appointment (where only 32% of patients expressed no preference for doctor or time) than of those requesting an urgent appointment (84% of whom did not express a preference for a particular doctor or time of day). Fishbacher and Robertson's work represents an important contribution to the literature in the undertaking of a prospective, planned review of appointment provision and availability, and in differentiating issues arising from urgent and non-urgent appointment requests separately. The study was based in only one practice, and although the authors concluded their work by referring to the dissatisfaction expressed by patients over difficulties in obtaining appointments, this dissatisfaction was not measured, and nor were any attempts made to examine other sequelae which might result from difficulties in managing the appointments system in the general practice setting.

4.2.3.2 Telephone access: 'an intruder in the consultation'?

Although 90% of British households now have access to a telephone (Rao, 1994), British general practitioners, in contrast with their Danish counterparts (Hallam, 1992), have no contractual obligation to provide telephone accessibility to their patients. Indeed, telephone consultations remain an unusual feature of British general practice (Hallam, 1991) and may be regarded (along with other technologies) as unhelpful 'intruders in the consultation' (Sullivan, 1995). Research however has suggested that an increase in the availability of such consultations would be welcomed by patients, and that the single most important step in improving the accessibility of and satisfaction with primary medical care would be the increased availability of telephone medical advice, being rated more highly than better receptionists, longer surgery hours, longer consultations or improved premises in one patient survey (Allen et al. 1988).

As with the operation of appointments systems, receptionists have a central role in controlling the telephone accessibility of doctors to patients, and it would appear that most have received little or no training for this aspect of their work (Copeman and Van Zwanenberg, 1988). In that report, only 30 (43%) of receptionists interviewed identified a good telephone manner as a key skill required for their job.

Telephone consultations between British general practitioners and their patients currently remain uncommon events. An extensive study from the north of England reported that 60% of 1500 general practitioners surveyed reported having less than 4 such patient contacts per day (Hallam, 1991), and only 10% had 9 or more such contacts per day (Hallam, 1992) compared with an average daily workload of 40 consultations (Royal College of General Practitioners, 1995b). The introduction of a dedicated telephone advice service in one large general practice resulted in only 3 telephone consultations per day for the 14000 patients of the practice (Nagle, McMahon et al. 1992); in contrast, Swedish general practitioners handle 3 telephone consultations per year for each member of the population (Marklund and Bengtsson, 1989), and in North America, up to 23 calls a day have been recorded (Hallam, 1989).

Maximising the opportunities for telephone consultations is best achieved through dedicated telephone consulting sessions which are advertised (Brown and Armstrong, 1995; Hallam, 1991). Such arrangements are in demand by patients (Allen et al. 1988) although the fear of additional workload may have lead some doctors not to publicise their service (Hallam, 1991). In a study by Nagle and colleagues (Nagle et al. 1992) from north west England, telephone contact with the doctor resulted in patients who were reassured, and who reported (in 75% of cases) that the contact had obviated the need for an appointment or (in 13%) for a home visit. Stainer (1992) and Daugird and Spencer (1988) have reported a similar economy of time with regard to doctor initiated telephone management as an alternative to face to face consultations. Brown and Armstrong (1995) also reported similar findings following the review of an established 'phone-in clinic' which had resulted in an estimated saving of 15 face to face consultations and 3 home visits per week for each doctor. The study involved a questionnaire survey of 259 patients who

had consulted the general practitioner by telephone during normal surgery hours over a four week period. The questionnaire was sent within 24 hours of the consultation, and of the 259 patients approached, a response rate of 83% (n=215) was achieved. In their study, only a small proportion (5%) of patients would not have pursued the initial contact had the telephone consultation not been available, and in this respect telephone management is presented by them as an alternative to a face to face consultation, rather than representing additional workload. Although Brown and Armstrong's survey (Brown and Armstrong, 1995) was undertaken in only one general practice, it is of some interest that there was no difference between cases using telephone consultations and age-sex matched controls with regard to the availability of transport - supporting the suggestion of Allen et al (1988) (following their work which involved a questionnaire survey as well as interviews with 793 patients from a large number of practices) that telephone accessibility was not being used as an alternative by patients simply on account of specific problems in relation to the geographical accessibility of practice premises.

Bhopal (1994) and others (Hallam, 1991) have considered the problems of scheduling telephone consulting sessions in the midst of a busy reception and Bhopal reported on the positive value and success of a patient education leaflet in modifying patient telephone usage patterns. Patients difficulties in obtaining telephone access to practices was the subject of an investigation by Marshall (1993). An audit of telephone accessibility identified that 57% of first calls to the practice were met with an engaged tone. Following the study, the authors proposal to purchase alternative telephone equipment would be usefully informed by Hallam's recommended standard (Hallam, 1993) of one incoming telephone line per 2500 patients although she does recognise the consequences of multiple telephone lines for reception staffing arrangements. Detailed guidelines have also been proposed for the use of answering machines where direct telephone access may not be possible (Benett, 1992), and in these situations it would appear that the 'tone' of the message, preferably delivered by a doctor, will have an important modifying influence on decisions taken by patients regarding an appropriate subsequent course of action.

Whilst the quality of care in telephone consultations has been questioned (Virji, 1992), and the drawbacks of being unable to examine the patient and of interrupted

consultations identified (Dearden, Smithers et al. 1996), no follow up studies have been reported allowing for a comparison using agreed outcomes of telephone and face to face consultations. In particular, there are no reports of the numbers of failed or unsatisfactory consultations using (for example) a recognised measure such as reconsultation rates for the same episode of illness (Howie and Hutchison, 1978). A Swedish study (Marklund, Koritz et al. 1991) has reported high levels of concordance between information obtained and management plans formulated during a telephone consultation with a nurse, and a follow up visit to the surgery for a consultation with the same nurse, or a doctor. Telephone consultations were concluded to be complementary to surgery consultations -in contrast with work reporting the value of telephone consultations as a substitute for routine clinic follow up in a wide variety of hospital based clinical situations (Rao, 1994; Wasson, Gaudette et al. 1992).

A further area where telephone advice has been examined relates to the delivery of primary care outside of normal working hours. Wide variations in the use of telephone advice have been reported in previous studies, from 20% (7 doctors from 3 practices in Cambridgeshire) (Perry and Caine, 1990), to 37% (5-57%) (77 doctors from 13 practices in North London) (McCarthy and Bollam, 1990), 57% (2 doctors, Teeside) (Marsh, Horne et al. 1987), and 74% (1 doctor, Kent) (Ridsdill Smith, 1983) – figures suggesting the existence of a considerable range of behaviour amongst doctors. These figures will be referred to again in the course of discussing the findings of the first study to be presented in this thesis. The causes for this variation in doctor behaviour have not been identified but previous work suggests that the time at which a contact is received may be of importance in influencing the management of that contact with regard to the use of the telephone. Livingstone et al (1989) reported a low use of telephone advice overall in the management of out-of-hours contacts (24%), but a substantially higher use of telephone advice for night-time contacts (41%) by the 8 doctors from two east London practices. Hobday (1993) records personal evidence of an overall 74% use of telephone advice for out-of-hours contacts and a lower threshold of visiting night contacts (63 % telephone advice). Ridsdill-Smith (Kent) (1983) reported a personal use of telephone advice for 51% of daytime or evening contacts compared with 14% for night contacts. On the basis of these findings, it would seem appropriate to consider that doctors will vary

in their use of telephone advice in managing out-of-hours contacts, and that the time at which contacts are received may be of importance in determining the management adopted by the doctor.

4.2.3.3 Receptionists: a new gatekeeper?

Whilst general practitioners are recognised as key providers of 'first contact care'(Starfield, 1994a), the receptionist is usually the point of first contact in the process of consulting. Cartwright and Anderson (1981) reported that for 91% of patients the decision regarding how soon an appointment was to be given was taken by reception staff. Despite this role, little has been published on the training and operation of receptionists since Arber and Sawyer's discussion on the role of the receptionist in general practice (Arber and Sawyer, 1985).

Studies of access to primary care have revealed the extent of feelings expressed by patients in relation to reception staff; a consumer survey noted that 'many people commented with considerable force and eloquence on the behaviour of doctors' receptionists (National Consumer Council, 1981). Having said this, one patient survey (Ritchie et al. 1981) (see page 33) reported a majority (75%) of patients with comments in favour of reception staff, and considerably fewer patients (10%) making negative comments. 'Ten per cent' however represents a substantial minority when considered in relation to workload or patient numbers, and this total volume may account for the perception of the receptionist as the 'dragon behind the desk' (Arber and Sawyer, 1985). An extract from Cartwright and Anderson's second survey of patients highlights one patient's view of receptionists:

'It's not right. Why should they pick and choose, they're not there to look after you, they're only there to put your name down at the nearest time. They want pensioning off in my opinion. I've been there and seen them put my name down for two days later and I could see on the sheet that she had free appointments earlier than that. What can you do? If you moan you're up the road again - you get nowt. If you're face doesn't fit with them two, you're out.'

(Cartwright and Anderson, 1981 p. 32)

Apart from the strength of feeling expressed in this comment, one can identify the personal element of the observations made - and the perception of the receptionist as the owner of the appointments system and a powerful controller of access to the doctor. These findings are echoed in the findings of a community council survey

examining patient satisfaction with general practitioner services in which there was resentment amongst substantial numbers of mothers of young children with the perceived 'attempts by receptionists to bar access to doctors' (Williamson, 1989).

Varying opinions have been expressed by patients regarding the appropriateness of receptionists in enquiring regarding the patients condition prior to giving appointments. The Department of Health Survey (Ritchie et al. 1981) (see page 33) reported that the majority of patients (63%) felt the receptionist should 'never' ask why the patient wants to see the doctor - significantly different from the 22% of doctors reported by Cartwright and Anderson (1981). Perhaps this difference in perception of the receptionists' role between patient and paymaster accounts for some of the sense of lack of appreciation reported by receptionists in the north-east of England (Copeman and Van Zwanenberg, 1988) where only 7 out of 10 receptionists felt valued by their practice, and only half felt valued by the public. A further contributing cause in this sense of estrangement is reflected in Wilkin's study (Wilkin et al. 1987) of practices in the north of England where only 30% of general practitioners interviewed recognised reception staff as part of the primary care team, and only 12% of practices had formal team meetings involving their reception staff (similar figures to those reported previously from the north east of England (Bond, Cartlidge et al. 1985).

Research from north America has reported the influence of patients' social characteristics on management decisions taken by reception staff following consultation requests resulting in attributing varying levels of legitimacy to those requests. In contrast, surveys of British patients (Ritchie et al. 1981) and receptionists (Arber and Sawyer, 1985) have revealed no systematic effect on the perception of reception staff by patients from different social classes, or on the influence of the patients social class on receptionists' behaviour. It is not clear how the different role of payment for service in the American and UK systems of primary health care might influence these perceptions. Whilst patients' social class may not be of great significance on the receptionists' operation, patient's age and being a parent of a young child appears to be of more importance with younger adults and parents of children reporting more difficulty with reception staff than other groups of patients (Arber and Sawyer, 1985).

Despite a key role in controlling access to general practitioners through management of appointments systems, telephone access, and home visits, reception staff generally receive little formal training for their role. Not only must they be aware of practice policies, but may also have to respond to individual doctor variations on these policies in the group practice setting (Arber and Sawyer, 1985). The ability to determine the appropriate urgency of a patient's request for care is central to their role (Greig, 1984) - and this has been reported to involve elements of clinical decision making on occasions - for example, determining the likelihood of a diagnosis of measles in responding to a home visit request (Arber and Sawyer, 1985). Copeman's description of receptionists as 'badly trained and taken for granted' (Copeman and Van Zwanenberg, 1988) highlights the dilemma faced by many reception staff acting as unqualified mediators of medical care - that study reported that only 13% of 70 receptionists in 20 practices had received any formal training. Various attempts have been made to respond to receptionist training requirements using formal structured courses delivered at educational institutions or through training programmes using distance learning. Video recording of receptionists' interactions with patients has been reported as providing an acceptable and effective means of receptionist training (Sharp, Platts et al. 1989). An alternative approach has been adopted experimentally in Sweden (Andersson et al. 1995) where primary care nurses (rather than receptionists) have taken responsibility for the operation of the appointments system. The authors suggested that the quality of subsequent consultations had 'probably improved' although the basis for this conclusion was not made entirely clear.

The problem of receptionists having 'substantial informal but little formal power' was documented by Freeman (1989) in relation to the receptionist's role in influencing a further dimension of access to care - personal continuity of patient care - considered a desirable feature of general practice by general practitioners (Royal College of General Practitioners, 1973) and patients (Baker and Streatfield, 1995; Allen et al. 1988) alike, and (when achieved) associated with patient satisfaction (Hjortdahl and Laerum, 1992). In his observational study of 22 receptionists, Freeman concluded that reception staff do indeed have an influence on personal continuity of care between doctor and patient, but that the influence was small in relation to other

factors (such as a practice personal list policy) ultimately determined by doctors in the team.

Receptionists are established as key players in the primary health care team, working alongside health professionals and significantly influencing the accessibility of primary care. Inadequate training, an unclear definition of their role and personal behavioural influences may affect their performance, and evidence exists to suggest that important 'accessibility sequelae' may ensue for patients as a result of some of the problems referred to here.

4.3 Psychosocial determinants of access to care

Sir Douglas Black's report (Black, 1980) on the differential health experience of subgroups within the British population attempted to explain that experience through a consideration of the underlying causes. The report concluded that, of four possible explanations considered, material deprivation and cultural⁴ elements were important contributing variables although primacy was given to the materialist variables. Whitehead (Black, 1980) followed up this work, and identified three elements of access to care described as 'potential barriers requiring attention' - geographic, cultural, and economic. The first of these has already been addressed, and in this chapter we shall consider the psycho-social determinants of access to care, giving consideration to cultural and economic (material) variables. Black identified the cultural elements of access as relating to lifestyle behaviours - smoking, alcohol, diet, exercise and so on whilst the material elements were judged to relate to considerations such as housing tenure, family income etc. The interaction of cultural and social factors is of importance, and one recent study (Uitenbroek, Kerekovska et al. 1996), although highlighting differences in health behaviour between Bulgarians and Scots, noted that educational and employment variables operated *within* the

⁴ Hannay (Lecture Notes on Medical Sociology 1988 Blackwell London p 49) provides a useful definition of the concept of culture as 'the meaning frame or world view which a person assimilates so that they can participate in social life ... the organisation of shared experience which determines our pattern of thinking and feeling'. In this section, the term is used in a rather more limited way, considering only some of those elements of culture which may influence a person's access, or perception of access, to primary medical care

cultural framework in influencing health behaviour patterns - hence better educated and employed subjects behaved in a more healthy manner irrespective of their location. In 1996, Watt documented the differential health experience of people living in Edinburgh and Glasgow, and notes that socio-economic factors transcend the cultural differences between the west and east coasts of Scotland. Although Glaswegians have a substantially increased mortality compared with the citizens of Edinburgh, Watt's work showed that 'comparing rich with rich and poor with poor shows little difference between the cities'. Wilkinson has recently reviewed evidence regarding the association between poverty and health, and argued forcefully that it is relative poverty within a society, rather than absolute poverty which has the prime impact on health status (Wilkinson, 1997). He did not however consider the issues of accessibility of primary care specifically, leaving this to others in reports to be considered later (Heath, 1997; Pringle, 1997). Finally, studies of Vietnamese Americans (Jenkins, Le et al. 1996; Gellert, Maxwell et al. 1995) have identified the influence of traditional health beliefs operating with the Vietnamese American subculture, but concluded that these traditional beliefs and practices did not act as barriers to access to Western medical care or to the utilisation of preventive medical services .. 'the cultural attributes of individuals did not explain either lack of health care access or underutilization of preventive health care services'. In the context of a consideration of access to medical care, it is probably more appropriate to see cultural factors as relating to peoples perceptions of illness, and of their understanding of the role and nature of medical services including the 'personal accessibility' of the general practitioner.

4.3.1 Cultural issues

4.3.1.1 Medicine in Society

In considering the cultural factors influencing the accessibility of primary medical care, one is immediately drawn into a consideration of the role given to medicine (or at least acquired by doctors) by society. Whilst the history of medicine in the last hundred years has centred round the development of 'bio-medicine' with its emphasis on diagnosis and treatment (Armstrong, 1983), a much broader approach to patients has been opened up following the thinking of Parsons (the sick role) (Parsons, 1951), Mechanic (illness behaviour) (Mechanic, 1962) and Balint (Biographical medicine: the doctor as a drug) (Balint, 1964). These authors challenged some of the

premises of bio-medicine using available information to highlight the behavioural elements evident in interactions between doctors and patients - the 'games people play' (Berne, 1964). Much of modern general practice has followed on from the development of these themes culminating in influential statements on the future of general practice made by the RCGP (Royal College of General Practitioners, 1996b; Royal College of General Practitioners, 1973) and others (Levenstein, McCracken et al. 1986) and supposedly offering a more patient centred approach to the delivery of primary care than had hitherto been the case.

This patient centred approach with the meetings of the 'expert' doctor and patient (Tuckett, Boulton et al. 1985) might have been expected to be reflected in government policy controlling the development of primary care during the 1990s but when patients' views on good health care in general practice were compared with published government views, a considerable difference between patient and government views was identified (Smith and Armstrong, 1989). The risk that 'good health care' might be difficult to achieve in these circumstances was suggested. In particular, Smith and Armstrong's study highlighted the emphasis given by patients to the personal accessibility of medical care (my term) as reflected in the priority attached to personal style, knowledge of the patient, listening ability, continuity of care, team care, and some organisational elements of care relating to appointments, waiting time and premises.

4.3.1.2 'Illness'

Judged by many to be the *raison d'être* of the medical profession, it was not until 1962 that Mechanic challenged the ascendant bio-medical model of illness and described the experience and management of symptoms in terms of a pattern of behaviour, rather than necessarily the product of an underlying patho-physiological process. And behaviour is par excellence influenced by the social milieu and characteristics and beliefs of the individual. Cultural factors may be considered important in determining an individual's vulnerability to and interpretation ('labelling') of symptoms as well as in the subsequent management strategies adopted in respect of those symptoms. Hannay (1988) highlights the cultural influences operating in Asians in the experience and expression of pain, anxiety or grief, and in the problems experienced by Middle Eastern women when being examined by a

male doctor. He also describes a study by Brown (1976) of London women whose risk of developing depression was much greater if four socially determined amplifying factors were present: lack of employment outside of the home, lack of a confiding male relationship, loss of a mother before the age of 11, and the presence of three or more young children. These may be considered cultural features predisposing an individual to the experience of symptoms which may or may not then be labelled as a depressive illness. Zola's description (1973) of five social triggers used to define the normality/abnormality of experienced symptoms and justifying a consultation with a doctor may be seen in terms of a process by which a person applies a framework of cultural norms to their own experience in justifying their use of the 'sick role'.

A considerable literature exists in relation to the interaction of culture (individually held values and beliefs) with an individual's understanding and perception of 'illness'. Best well known amongst a number of models of understanding 'illness' is Rosenstock's Health Belief model (Rosenstock, 1966) in which culturally determined core beliefs are hypothesised to predict the likelihood of a pattern of behaviour occurring (Figure 2).

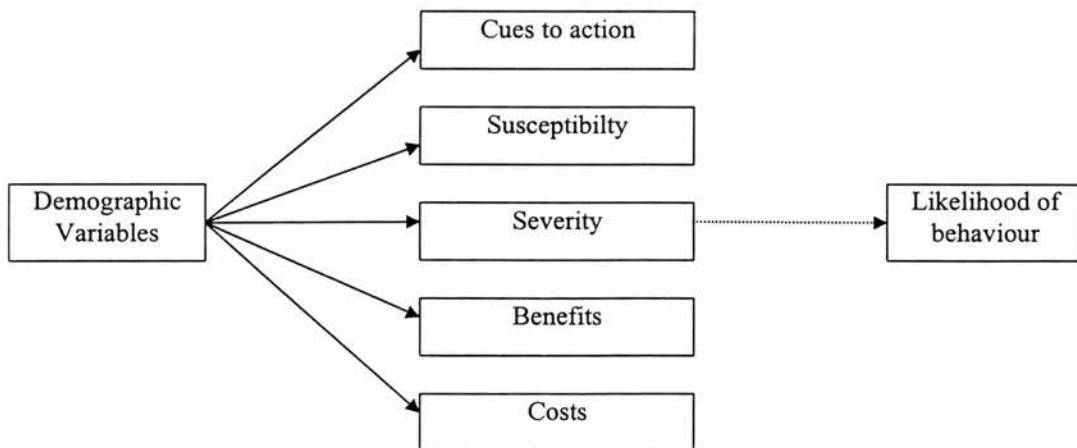


Figure 2 Basics of Rosenstock's Health Belief Model (after Ogden, 1996)

The health belief model originated from the theory that behaviours result from a

rational weighing up of the potential costs and benefits of that behaviour, and the model incorporates five core beliefs which might be modified by an individual's personality or by other external factors (such as a leaflet in a waiting room). This model (and its related Health Action Model (Ajzen and Fishbein, 1980)) have proved useful in predicting health behaviour patterns - for example the responsiveness of an individual to a cervical screening programme (Murray and Mcmillan, 1993), although some have judged it to provide a useful framework when considering screening rather than providing a true model of patient behaviour (Gillam, 1991). In relation to access, Rosenstock (1966) noted that external access factors (such as distance) may be important additional modifiers even where the psychological components of the model predicted utilisation of a service. Campbell and Roland (1996a), using a modified version of the health belief model as a basis for reviewing the literature on patient consultation rates, confirmed the importance of poor health status and social disadvantage as well as a range of other social and psychological factors as factors influencing consulting behaviour. By itself then, the health belief model would appear to be useful, but not the complete story - as evidenced by Calnan's research on breast cancer screening (Calnan and Rutter, 1986; Calnan, 1984) where the model was only a 'weak predictor' of behaviour. Belgian research has commented on culture in relation to health behaviour that '...it is peoples' perceptions and beliefs about their health, rather than clinically objective states that are the major determinants of illness behaviour in general and ... utilisation behaviour particularly' (Foets et al. 1985).

4.3.1.3 The consultation: a meeting of minds?

Much of the work relating to the personal accessibility of general practitioners has focused on the dynamics of the consultation and a variety of indicators have been suggested as measures of the outcome of the consultation. Investigation of the outcomes of health care have become an important part of many medical disciplines, and whilst Lohr's 5 D's - death, disease, disability, discomfort or dissatisfaction (Lohr, 1988) might be useful outcome measures in some settings, the less reductionist approach espoused by Maxwell (1984) and involving considerations of access to service, relevance to need, effectiveness, equity, social acceptability and efficiency/economy are probably of at least equal relevance as outcome measures of quality in late 20th century general practice.

4.3.1.3 (a) Doctor style

Patient satisfaction may be considered as one measure of the accessibility of medical care, and the effect of doctor style on patient satisfaction has been investigated in a number of recent studies. Wilkin's study of general practice in the north west of England (Wilkin et al. 1987) reported high levels of patient satisfaction, and overall, the doctor's attitude was considered more important than technical competence, although there was an interesting difference between men and women in this regard with 67% of women rating attitude as most important compared with 40% of men.

Savage and Armstrong (1990) reported on a randomised controlled trial of doctor style and patient satisfaction, and challenged the conventional wisdom that sharing possibilities, uncertainty, and decisions about treatment leads to a more adult relationship (in transactional analysis terms) with the patient. In their study (whose methodology and conclusions were subsequently challenged (Kinnersley, Owen et al. 1990) and defended (Savage and Armstrong, 1991)) a more directive style resulted in increased satisfaction at least for patients with a 'physical problem' or who received a prescription. Of some interest however was their observation that 'a directing style did not seem to give greater satisfaction in longer consultations' - a finding given further weight by Howie (Howie, Porter et al. 1991) who suggested that patient satisfaction was not primarily related to doctor style but to consultation length. Consultation length is a key issue which will be returned to later in this thesis, but it is known that doctors who have longer consultations are more likely to be women, members of the RCGP, older and with a positive orientation to general practice and mental health issues (Howie, Hopton et al. 1992; Gray, 1982; Raynes and Cairns, 1980; Buchan and Richardson, 1973) and to identify and deal with more of the psychosocial issues raised by patients during consultations and to carry out more health promotion during the consultation (Howie et al. 1991). The importance of time pressure in relation to doctor style was highlighted as one measure predicting dissatisfaction by Hopton et al (1993).

Appearance and the use of first names have been investigated as factors influencing the doctor-patient relationship, and in general it appears that first impressions are of importance (Short, 1993), and that patients prefer a degree of formality to be

maintained in their dealings with doctors, particularly with regard to dress (McKinstry and Wang, 1991) (which may influence the perception of competence (Taylor, 1987), and the use of title when the doctor is addressed by the patient but not necessarily vice versa (McKinstry, 1990); these observations appear to transcend national boundaries, at least within a Western cultural framework (Gjerdingen and Simpson, 1989; Gjerdingen, Simpson et al. 1987). Subgroups of the population may have specific problems in establishing personal accessibility through a relationship with a general practitioner; general practitioners surveyed in Australia (Veit, Sanci et al. 1996) identified a range of barriers to access for adolescents some of which related to the fee-for-service system, but perhaps more importantly in difficulties in dealing with adolescent mental health problems for which (they suggested) more training was required at an undergraduate level.

4.3.1.3 (b) Continuity

Reference has already been made (page 70) to the issue of continuity of care - judged as a desirable feature of general practice by doctors and patients. In this respect, access to continuity of care may be considered a marker of quality of general practice, although a survey in 1990 (Freeman and Richards, 1990) concluded that the degree of personal continuity of care was fairly low in group practices, especially amongst those not operating a 'personal list' system, and particularly for younger and healthier patients. Patients from practices offering continuity of care are more satisfied with the care they receive than those from low-continuity practices who are more critical, particularly in relation to the role of receptionists and appointments systems (Freeman and Richards, 1993). Patients not receiving continuity of care are not only younger, but have been judged to be a vulnerable group with additional morbidity and relationship problems. Their pattern of consultations may be characterised by difficult consultations, non-attendance, and an increase in the use of non-appointment consulting sessions (Sweeney and Pereira Gray, 1995). One Australian study (Liaw, Litt et al. 1992) has suggested that continuity may be perceived as a more important issue for patients from lower socio-economic groups compared with middle class patients who identified 'art of care issues' as being of greater importance. These findings however must be judged with caution in view of the very low (20%) response obtained to the questionnaire element of the study. Given the importance of continuity, it is not surprising that a number of indices

purporting to measure it have been proposed (Freeman, 1987), and although considered desirable, Freeman has highlighted the potential conflict between the ability to deliver continuity of care and the rise of group practice (Freeman and Richards, 1993), and has also noted that patients receiving more personal continuity of care are likely to be older, to have booked their most recent appointment further in advance, to desire personal continuity of care, to have an external health locus of control, and to have a lower extroversion score than those patients having less personal continuity of care. Some commissioners of care now accept the principle of continuity as relating more to team continuity rather than personal continuity between one doctor and one patient (Lambeth Southwark and Lewisham Health Authority, 1995).

4.3.1.3 (c) Content

With regard to the appropriateness of the general practitioner as a source of advice regarding non-medical problems faced by patients, Cartwright and Anderson's studies reported a decline between 1964 and 1977 in the numbers of patients who thought it was appropriate to talk to the general practitioner about relationship problems (from 40% in 1964 to 30% in 1967) (Cartwright and Anderson, 1981), and this appeared to be matched by a reduction in general practitioners' tolerance of such consultations. In those studies, the nature of the doctor-patient relationship was examined through a consideration of the doctor as 'something of a personal friend'. Overall, 32% (1977) of patients regarded the relationship in this way, but the authors drew attention to the association of the decline in the frequency of home visits with the decline in the personal nature of the relationship from 44% in 1964. If considered to reflect personal accessibility of doctor to patient, these figures suggest that a decline in personal accessibility occurred in the period between the two surveys.

Does the personal accessibility of the doctor - the extent to which doctor and patient concur on management - make any difference to the outcome of patient care? This question was addressed by South African researchers using methods which were judged to be valid, reliable, sensitive and easily applied (Henbest and Stewart, 1989). Patient centredness (defined as care in which the doctor allowed the patient to express all of their reasons for attendance) was associated with resolution of the patient's concern and symptoms (Henbest and Stewart, 1990) and the authors highlighted the importance of the quality of the professional relationship in

influencing the outcome of care. Improved resolution of symptoms has been described following agreement achieved between patient and doctor regarding the nature of the problem (Bass, Buck et al. 1986) and following positive rather than negative consultations (Thomas, 1987). Such an approach may come with a price however, and Howie et al (1992), examining stress amongst general practitioners, identified a three fold increase in self perceived stress amongst patient-centred doctors compared with those who were less patient-centred, an effect that might apparently be modified through manipulation of booking intervals. Patient-centred doctors with an inherently slow consulting style who saw patients at a 'fast' rate appeared to experience person role conflict 'arising out of the interaction of their commitment to patient-centred doctoring and to high quality of care, with high work rate and little opportunity to control the pace at which they work'.

Investigation of satisfaction with general practice has highlighted the importance of communication, the nature and quality of the doctor-patient relationship, and professional competence as key determinants of patient satisfaction (Williams and Calnan, 1991b; Curtis, 1987), and these influences have been found to have a degree of convergence across general dental practice and hospital care settings as well as in general practice (Williams and Calnan, 1991a) in Canterbury (England), Belgrade (Yugoslavia) and Ioannina (Greece), but not in Moscow (USSR) (Calnan, Katsouyiannopoulos et al. 1994). In these studies, although global satisfaction with general practice services was high (95% of respondents), more detailed questioning revealed significant levels of dissatisfaction (up to 38%) in specific areas, for example reported difficulties in discussing personal problems. Evidence has been provided (Evans, Kiellerup et al. 1987) that an improvement in patient satisfaction with the consultation may occur following the teaching of communication skills to general practitioners. Hopton Howie et al (1993) reported the importance of long waiting times as a predictor of patient dissatisfaction, as well as six other factors broadly reflecting the areas identified by Williams and Calnan. With levels of dissatisfaction of nearly 40% for specific areas, it would appear that general practice consultations may represent meetings of expert bodies, but not (in many cases) of expert minds!!

4.3.1.4 Ethnicity

Issues of cultural influences on access to health care for the black and ethnic minorities in the UK have recently been reviewed (Hopkins and Bahl, 1993). Not surprisingly, these minorities expressed dissatisfaction with prolonged waiting times in surgeries, but it is of some interest that Asian patients have been reported to express greater preference for late afternoon appointments, home visits in preference to telephone advice, and their own doctor rather than a deputy than their white neighbours (Farooqi, Hopkins, A. and Bahl, V.1993). Consultation rates are reported to be higher amongst Asians than white patients, superficially suggesting that access to primary care is not a problem in this group of patients. This conclusion is however reminiscent of the observations made regarding a comparison of health behaviour in Bulgaria and Scotland where the importance of examining socio-economically determined subgroups within the cultural grouping was highlighted (cf. page 72). Language, clearly an important component of culture, is reportedly a 'diminishing problem' amongst Asian patients when considered in relation to communication with the general practitioner (Jayaratnam, Hopkins, A. and Bahl, V.1993). Although many Asians deny communication difficulties with the general practitioner as a problem, Jayaratnam has suggested this to be partly related to the fact that many Asian patients select Asian doctors as their access to the NHS. Within the ethnic sub-cultures, a wide range of factors have been identified as being of importance in influencing the accessibility of primary care to patients from these communities. Apart from language, specific issues relating to communication, illness behaviour, religion, personal hygiene, childbirth and family planning, naming systems and health education have been identified as being of importance in considering cross cultural influences on accessibility of care, and these have been reviewed by Hopkins and Bahl (1993).

4.3.2 Material issues

Amongst the variables contributing to differential rates of access to primary care are those economic variables determining socio-economic status. It is difficult to distinguish individual components, since deprivation tends to be a multi-faceted phenomenon. Income, car ownership, housing, education, tenure of accommodation and employment status are all material variables (using Blacks' approach to defining elements contributing to inequality of health experience (Black, 1980)) which might

be considered relevant in a discussion of differential access to care. In addition, other factors (related but distinct) might also be judged to be of some interest, such as the availability of child care, or the occupational status. In this latter regard one might anticipate a paradox that the employed may be disadvantaged through difficulties in seeing the general practitioner during office hours, and there is evidence (Cartwright, Johnson et al. 1990) of a preference amongst those in employment for evening appointments as compared with mothers of young children who preferred mid morning appointments for their children.

Reference has already been made to the costs incurred in utilising health services. These may be direct costs, for example in relation to travel, or indirect costs, for example in relation to loss of earnings incurred by a visit to the doctor. In this regard, one might expect greater differences in health care utilisation amongst people from different income groups in countries operating a fee for service health system, and indeed such evidence exists. In Oklahoma, elderly patients were identified as using the (free) hospital casualty department for primary care because of the costs of private physicians (Bohland and French, 1982) and in California, the ability to pay has recently been confirmed as a determinant for health care for children (Smith, Kreutzer et al. 1996) and amongst the Vietnamese American population (Gellert et al. 1995). In the UK, the provision of dental services (involving a fee for service arrangement) is known to be poorer in less affluent areas (Carmichael, 1985) where the uptake of services is also lower (Carmichael, French et al. 1984). When financial barriers to care are reduced, there is evidence of an increase in the uptake of primary care suggesting an improvement in overall accessibility of primary care in that situation (Lee and Gillis, 1993). A further element of cost may be described as the opportunity cost described by Black (1980) as a rational process contributing to the weighting given by groups of the population to aspects of health care delivery systems. 'These costs and benefits differ between the social classes both on account of differences in way of life, constraints and resources, and of the fact that costs to the working class are actually increased by the lower levels and perhaps poorer quality of provisions to which many have access'. Davey-Smith and Egger have highlighted the worsening health differential of the population of Glasgow relative to other areas of Scotland between 1981 and 1989 and relates this to parallel 'increasing disparities in wealth and material well-being' (Davey-Smith and Egger, 1993). In

these circumstances, the marginal cost to the less affluent of a visit to the doctor will be substantially greater than the equivalent cost for the better off.

In the UK, direct costs to users of primary care are largely eliminated, and this may partly account for the high reported levels of access to primary care reported in Ritchie's work (Ritchie et al. 1981) (see page 33). Indirect costs however must also be considered, and in this respect poorer people may have greater difficulty than their affluent neighbours in following medical advice where costs may be incurred. This applies for example in obtaining prescriptions (Ryan and Birch, 1991) where it has been suggested that 'regular and frequent increases in the real charge for NHS drugs has been associated with a significant reduction in the rate of utilisation'. The process has been thought by some to represent a 'creeping privatisation' of the NHS (Heath, 1994) and judged by some to have the potential to do more harm than good (Freemantle and Bloor, 1996).

Transport issues have already been discussed in detail and in general, it would appear that the 'transport poor' are disadvantaged with access to care, especially in rural areas. An interesting study from East Anglia (Bentham and Haynes, 1992) reported the response of a rural village population to the introduction of a mobile (caravan) general practice service and concluded that such a service might be used to reduce the problems of physical access in remote villages to the level of those in villages where practices are located.

Although it has been shown that not being a home owner, not having access to a car, having a lower educational level and being in a lower social class group are all related to higher mortality, and that these effects are partially independent of each other, studies examining differentials in health experience have often used aggregate measures (such as 'social class') as independent variables. I have highlighted on a number of occasions throughout this thesis, that access to care should not be seen as an absolute phenomenon, but closely related to the issue of the quality of care being accessed. As long ago as 1968, Titmuss wrote:

'...higher income groups know how to make better use of the service; they tend to receive more specialist attention; occupy more of the beds in better equipped and staffed hospitals; receive more elective surgery; have better maternity care; and are more likely to get psychiatric help and psychotherapy than low income groups - particularly the unskilled'

(Titmuss, 1968 p. 204)

... and the evidence from general practice is that here too the higher social classes are better able to access quality care. Rather contentiously, Cartwright and Anderson suggested that 'people living in Conservative areas had doctors who could be thought of as 'better' (Cartwright and Anderson, 1981) on account of possessing 'desirable attributes' such as a hospital appointment. The measures adopted by Cartwright and Anderson may not fit with current definitions of good quality general practice, but certainly it has been recognised by a number of authors that middle class patients have longer consultations with the doctor than working class patients, and that the doctor is more familiar with their domestic situation and provides them with fuller explanations of their problems (Raynes and Cairns, 1980; Westcott, 1977; Cartwright and O'Brien, Stacey, M.1976).

5 Measuring Accessibility

A wide range of indicators of accessibility of health care have been referred to, but access is (as I have described) a multi faceted concept rather than a precise physical entity. Measures of accessibility are therefore dependent on arbitrary standards rather than inherently 'correct' or absolute baselines. The basic principle of the NHS that equity should exist in service provision implies that inequity is a cause for concern whether amongst population groups or between geographical areas.

5.1 Geographical accessibility

Various forms, or expressions of accessibility have been described. Perhaps the simplest of these relates to geographical determinants (distance, travel time and transport) which have been incorporated into discrete measures by a number of authors. At best, these have been described as 'a partial approach because distance is only one of a number of likely factors affecting access' (NHS Centre for Reviews and Dissemination and Nuffield Institute for Health, Ferguson, B., Rice, N., and Sykes, D.1996). Work already referred to from Aberdeen (1979) has been particularly significant. Knox (1979), commenting on the accessibility of primary medical care in

Aberdeen, recognised that ensuring adequate accessibility to general practitioners was only one of competing priorities facing health planners in that city. Knox, however, incorporated into his mathematical model elements relating to the total provision of consultation time within a given neighbourhood, as well as corrections for car ownership, public and private travel times, and the sizes of populations potentially involved for a given urban neighbourhood. The equations outlined below are progressive steps, building up to the definition of Knox's index of accessibility (I)⁵ which was computed using the following steps:

$$A_i = \sum_{j=1}^n \frac{(S_j)}{D_{ij}^k}$$

where:

A_i = accessibility of general practitioner services in neighbourhood i ;

S_j =size of surgery facilities in *urban neighbourhood* j (measured in total number of hours of consulting time available in a specific neighbourhood);

D_{ij} =linear distance between the geometric centres of neighbourhoods i and j ;

k =distance decay function (chosen on historical basis from published literature)

Incorporation of measures of the mobility of neighbourhood residents was accomplished through the following transformation to calculate the time-based index of accessibility for neighbourhood i and T_c and T_p are empirically derived estimates of the average time taken to travel a unit distance from the geometric centres of neighbourhoods by car and public transport respectively:

$$A_i(t) = C_i \frac{(A_i)}{T_c} + (100 - C_i) \frac{(A_i)}{T_p}$$

where C_i is the level of car ownership in neighbourhood

Finally, Knox included a correction for the 'population potential' of each neighbourhood (M_i)

⁵ These equations are provided in some detail only as illustrative examples of an approach to the definition and measurement of accessibility. They demonstrate the potential of mathematical modelling of a concept, with inclusion of corrections for a range of factors that may differ for the individual researcher. In reporting these equations, I have drawn extensively from Joseph and Phillips (1984) pp 103-105

$$M_i = \sum_{j=1}^n \frac{(P_j)}{D_{ij}^k}$$

where P_j is the population of neighbourhood j

The final index of accessibility (I_i) was calculated by scaling of $A_i(t)$ and M_i as a percentage of their respective highest computed values

$$I_i = \frac{A_i(t)[\%]}{M_i[\%]}$$

and thus values exceeding 100 indicate a relative overprovision in a given neighbourhood, whereas values below 100 indicate relative underprovision. Using this approach, Knox (1979) has plotted varying levels of accessibility according to location within an urban environment (Figure 3) the resulting plots thus taking account of variables incorporated in the index.

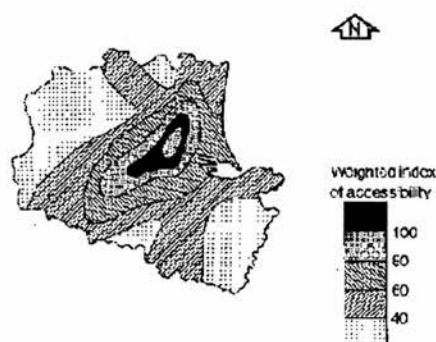


Figure 3 Relative levels of accessibility of primary care in Aberdeen, taking car ownership and population densities into account. Figure extracted from (Knox, 1979 Figure 3.)

This type of geo-quantitative approach has been adopted by many authors who have built into their models varying elements of access in an attempt to reduce accessibility to a manageable concept. Three dimensional plotting of general practitioner accessibility has been undertaken using data from Adelaide (Stimson, 1981a) incorporating theoretical demand curves for general practitioner medical services set in the context of a market place consumerist approach to primary care.

An alternative model has been developed by Joseph and Bantock (1984) based on regional data and defining a measure of potential accessibility of general practitioner services to individuals which incorporates a weighted measure of doctor availability. In this case the starting measure of nodal accessibility is:

$$A_i = \sum_j GP_j / d_{ij}^b$$

where

A_i is the potential accessibility of *rural enumeration district i* to general practitioner services

GP_j =general practitioners at j within the range of area i

d_{ij} =distance between i and j

b =exponent on distance (based on historical or published estimates)

Further developments of this model result in the following measure:

$$A_i^* = \sum_j (GP_j / D_j) / d_{ij}^b$$

where

A_i^* = the measure of potential accessibility of general practitioner services to individuals incorporating a weighted estimate of physician availability

D_j =the potential demand on a doctor at j and is a function of the magnitude of the population within the range of service offered (ie the catchment area) modified by their distance away

This latter definition is of importance since it requires to be informed by research data which may not prove to be available. On this account, equations such as those presented here must be considered only as approximations to a measure of accessibility within the area being examined. Having said this, such an approach to defining accessibility can be tested, and a recent paper (Rosenberg and Hanlon, 1996) reported the testing of a sophisticated mathematical model used to define health service “environments” aimed at predicting the utilisation of hospital services

in relation to the accessibility of primary care and the demographic profile of the local (Canadian) population. The authors concluded that their approach was useful in a situation where information on all the elements contributing to an equation might not be available. In a follow up report to their original work, Joseph and Bantock (Joseph and Bantock, 1984) examined the usefulness of their theoretical measure through a case study carried out in Southern Ontario. Although the authors highlighted the importance of weighting their measure for the availability of doctors, they do not seem to have validated their measure by any external measure of accessibility (for example by talking to patients). This is perhaps an indication of the limitation of single discipline research, and of the potential value for (academic) general practice with its multidisciplinary representation to inform developments in the social sciences as well as being informed by those developments.

5.2 Utilisation

Utilisation of services has been widely used as a measure of accessibility, but once again this might be considered only a partial explanation. Termed “revealed accessibility”, utilisation as a measure of accessibility is epitomised by Jarvis’s Law (Page 31) and a concept of distance decay where the rates of utilisation of a facility are inversely related to the distance from the facility. Examples of distance decay are evident from a wide range of medical disciplines, although most of the studies carried out have been based in secondary rather than primary care. Distance decay effects are thus reported in relation to mammography, cervical cytology, alcoholism aftercare, and use of Accident and Emergency services, and probably also for at least some inpatient services (NHS Centre for Reviews and Dissemination and Nuffield Institute for Health, Ferguson, B., Rice, N., and Sykes, D.1996). It is of some interest that a recent North American study (Kreher, Hickner et al. 1995) of the geographical influences (distance, travel time, and transportation) on mammography utilisation rates concluded that these rates were not significantly influenced by geographical factors relevant to the subjects studied. The work was based on a questionnaire survey of rural women older than 40 who were attending their family practice. Although confounding variables were controlled for, the fact that the subjects were attending their practice might have biased the conclusions reached since such subjects were already displaying health care utilisation behaviour. One would therefore wish to interpret the authors’ conclusions with caution. Further work

from North America (Newhouse, Manning et al. 1981) – part of the Rand Corporation's health insurance experiment involving the enrolment of 7706 persons in one of several health-insurance plans - identified that where doctor accessibility was increased through a reduction in the monetary cost for the individual associated with service usage, utilisation of services (as measured by cost) increased. In related work specifically examining the use of emergency services, it is of interest that a disproportionate amount of the increased use of services involved attendance for less serious conditions (O'Grady, Manning et al. 1985). Whilst it is difficult to translate findings from one health care system involving a fee for service to a centrally funded system such as the NHS, the equating of improved accessibility of medical services with increased service utilisation would appear to be a principle observed in both types of system.

Utilisation data represent one element of access, but many authors have identified that these figures must be viewed in terms of need in the population being examined. The proportion of 'total need' for a given population coming to the attention of the doctor (as in Hannays iceberg) might be considered a measure of the accessibility of service - in the USA, this idea has been used to develop a need based indicator of the access concept - the use/disability ratio, similar to the 'use/need' ratios proposed for use in the UK by Brotherstone (1976).

5.3 Satisfaction

Closely related to utilisation of services in Aday and Anderson's model of access (1974) is the idea of consumer satisfaction. Aday and Anderson suggested that consumer satisfaction was "best evaluated in the context of a specific and identifiable episode of medical care seeking". They proposed that dimensions of access relevant in relation to satisfaction might include convenience, co-ordination, cost, courtesy, information given.. and quality (Aday and Andersen, 1974). This approach encompasses a wide range of measures and has been incorporated in many recent UK based studies which have examined access not simply as a global concept, but satisfaction with specific (access related) elements of the health care delivery system (Baker and Streatfield, 1995; Calnan, Cant et al. 1994; Gribben, 1993; Baker, 1991; Aronoff, 1989; Allen et al. 1988).

6 Improving Access to Primary Medical Care

Much of the foregoing discussion of the literature has related to initiatives in primary care where issues of accessibility have been identified and explored. Fewer studies have considered interventions aiming to improve access although a wide range of descriptive work has been reported, and it is this section of the literature I wish to consider here. The framework adopted for this consideration of access has explored the geographical, organisational and psychosocial elements of access, and this will continue to provide a reasonable framework for a consideration of initiatives aimed at improving access. The preceding section has referred to the measurement of accessibility using mathematical modelling (incorporating in such models a number of relevant variables such as distance, travel time, appointment availability, hours of opening of premises, availability of private transport), investigation of utilisation rates of services, and effects on patient satisfaction with the accessibility of services. Studies aimed at describing current arrangements or aimed at improving access to primary medical care have tended to use some or all of these elements as outcome measures. The lack of agreement on which are the most appropriate measures is a reflection of the complex and incompletely understood nature of the concept of accessibility, of difficulties encountered in collecting sufficient high quality information to construct a robust mathematical model, and of the rather nebulous nature of “patient satisfaction” as a valid measure of accessibility. Despite these difficulties, the concept of access has been pragmatically operationalised in previous studies, and an examination of these researches can usefully inform the understanding of the problem of access.

6.1 Geo-physical

Heath (1997) has suggested the 'the greatest strength of British general practice is the positioning of general practitioner care close to the patient, and at a distance from any institutional interest'. One might however challenge her assertion that this feature of general practice 'ensures accessibility' in view of evidence presented in the preceding discussion. Notwithstanding this observation, initiatives aimed at reducing the distance between doctor and patient have been undertaken, frequently targeting

areas of particular need. The Medical Practices Committee continues to exercise its control in favour of areas of recognised need. Where uptake of services is known to be poor, efforts have been made to take the service to the patient such as in the community based outreach antenatal clinics conducted in a deprived area of Edinburgh (Staines, 1983), or in the introduction of a mobile immunisation unit in Southwark, South London (Townsend et al. 1992 page 327). A similar initiative using a caravan to provide primary medical care to isolated areas of rural East Anglia (Bentham and Haynes, 1992) met with the approval of local patients and resulted in a substantial increase in consultation rates in a village where the mobile surgery was a new arrangement. In a similar vein, branch surgeries are recognised as providing a valuable service in rural communities (Fearn, Haynes et al. 1984). It is of note however that in the survey of users and non-users of branch surgery premises on which their work was based, Fearn et al identified that of those using the branch surgery “few compared the service favourably with that of the main surgery *except in terms of accessibility*” (my italics), and amongst non-users, opinions were expressed regarding the poor facilities and limited opening hours. In line with the observations made previously regarding the “inverse care law” described by Tudor Hart, Fearn et al identify that it is those in greatest need of health services (those from the manual social classes, the elderly, and those without cars) who are most likely to use the facilities of the branch surgeries with their lower levels of care (as characterised by inadequate waiting areas, and the absence of reception staff and basic clinical equipment such as specula, peak-flow meters or vision testing charts). Having said this however, it is clear that withdrawal of the (albeit basic) facilities offered by the branch surgery would disproportionately disadvantage those in greatest need; it seems reasonable to suggest that access to modest services is better than no access to services. It also seems clear that efforts in such situations need to be directed at improving the quality of the services being utilised locally rather than in relocating services centrally with the knock-on adverse effects on accessibility that would be likely to ensue.

The problems of the 'inappropriate' use of Accident and Emergency services for problems which might be wholly managed within the context of general practice have been addressed by attempting to shift the locus of care from a (more distant) secondary care setting to a community based setting led by primary care trained

rather than hospital trained medical and nursing staff thus reducing the distance between provider and service user (Campbell, 1995). Evidence has been provided that patients use such units effectively and discriminatingly (Dale and Dolan, 1996). Such an approach is only one of a number of alternatives which have been considered in recent years including the introduction of a primary care ethos into A&E departments (Dale, Lang et al. 1996), and by the use and development of nurse led care and triage systems within A&E Departments (Heaney and Paxton, 1997; Dale, 1992).

Initiatives with regard to patient transport have also been undertaken with one doctor reporting the provision of a taxi service to the practice in an attempt to reduce home visits (Browne, 1997). It is reported in the popular medical press that this type of approach has also been adopted on occasions by providers of out-of-hours services who have offered to provide transport for patients able to attend centralised community based out-of-hours provider centres. There are however no published studies reporting the effect of such arrangements on the measured accessibility of services.

6.2 Organisational

Widespread changes have taken place in recent years with regard to the organisation of UK primary care. Increasing numbers of practices are computerised, and computerised appointments systems are now available, and are being introduced and evaluated (Campbell, Roland et al. 1996b). Whether these are more effective than older manual systems is not clear although the authors of this study carried out in Manchester reported that the introduction of a computerised appointment system resulted in 'an improved service for patients and more efficient use of time by both doctors and receptionists'. Changes have however taken place in the operation of appointments systems, with practices moving towards longer appointment intervals, and with the increasing use of appointments systems referred to previously.

Receptionist training programmes, some with vocational qualifications, are now available, and are utilised by an increasing number of practices. Such programmes address the needs of primary care reception staff specifically, and thus begin to

address the problem of under-training (Copeman and Van Zwanenberg, 1988). Silverstone et al (1983) report on the evaluation of a receptionists training programme undertaken by the Personnel Research Unit of the University of Bristol which aimed to identify individuals' expectations and training needs, and to assess the effectiveness of the course. Based on interviews, and the completion of task assessment forms by trainee receptionists and doctors, the authors concluded that such courses were valuable in improving the performance of reception staff, in increasing knowledge of primary care, in increasing confidence amongst participants, and in an increased awareness of the value of training. Few other studies have formally evaluated the impact of receptionists' training courses. One study (Carnegie, Gomel et al. 1996), a randomised controlled trial carried out in Australia, examined the effect of intervening with a health promotion training and support programme for reception staff on their attitudes towards preventive care provided in general practices in Sydney. One hundred and fifty receptionists were randomly allocated to receive one of four training programmes of varying intensity. All staff from any one participating practice received the same training programme. The authors highlighted the importance, not just of training, but of ongoing support for reception staff following training. Without ongoing training, the attitudes of reception staff (the principal outcome examined) became very negative towards an ongoing involvement in preventive health care. Whilst the results obtained from Carnegie's study of receptionists training in relation to clinical process and care may not be directly applicable to training in relation to practice administration and the management of issues relating more directly to the accessibility of care (such as the control of appointments systems and telephone access), it would seem reasonable to suggest that ongoing support of reception staff is likely to be more beneficial than isolated short-term intervention with training schedules.

The problem of poor quality practice premises is particularly acute in inner cities, especially in London where 45% of practice premises are below minimum standards (Tomlinson, 1992). Following the Tomlinson recommendations of 1992, the London Implementation Zone initiatives were established, one of whose key targets was to improve the quality of practice premises in London, and substantial investment has recently taken place in development of premises in London with a considerable turnaround in the overall quality of practice premises being reported by some health

authorities (Lambeth Southwark and Lewisham Health Authority, 1996). Since the quality of premises and facilities from which services are provided is one component of the access equation, moves to improve the quality of general practice premises results in an overall improvement in the access to better quality services

Issues in relation to the recruitment and retention of general practitioners continue to evolve, although the problems presented have not yet been adequately addressed. Some initiatives in this area have been described already, but a recent white paper on the future of primary care services (Secretary of State for Health, 1996a) has raised the prospect of a salaried general practitioner service operating from commercial premises or in association with commercial enterprises such as supermarkets or pharmacies; the launch of a recent bid for practices to participate in pilot schemes for salaried service has been reported to have been met with widespread interest (Anonymous 1997), with 500 practices in England expressing an interest in participating in such a scheme. In the US, an expansion in physician numbers during the 1970s was associated with improved geographical accessibility for individuals in rural and semi-rural situations with a further improvement in geographic access anticipated during the 1980s (Williams, Schwartz et al. 1983). This improved accessibility was attributed to the effect of market forces operating within the fee for service, insurance based system of health care. The authors of that work noted however that 'these forces cannot be expected to increase notably the number of physicians in very sparsely settled areas' which would continue to be economically unattractive to physicians. Given these observations, the use of a central supervisory organisation such as the UK's Medical Practices Committee (MPC) would seem to be appropriate. In the UK setting the 'commercial option' might improve the accessibility of the service to the population (responsive opening hours, 'one stop' health and service location, improve transport and parking) but Pringle has argued (1997) that the *nature* of the service may also be substantially changed by such a move, not just the spatial and organisational elements of accessibility. It is possible that the combined effects of improved premises and alternative working/contractual arrangements may have an overall benefit to patient care at least in certain locations such as inner cities.

Substantial changes have also taken place recently in the reimbursement for UK

general practitioners with a move towards an increasing capitation component in remuneration accompanied by increased use of target payments to promote activity in areas such as immunisation or cervical screening. Some have judged this to be a most effective way for modifying health care delivery, and the responsiveness of general practice to such legislative and organisation changes has been documented by health economists who have reported the 'definite and strong response to the new incentives' amongst 340 practices in six English health authority areas (Leese and Bosanquet, 1995a). As a result of important organisational and contractual changes, it would appear that a greater proportion of the population have had access to improved services in recent years, particularly for those activities targeted for special payments. Following the apparent success of such arrangements, proposals suggesting the targeting of breast cancer screening by general practitioners have been made (Majeed, Cook et al. 1995). The inverse care law however continues to apply, with inner city areas with high levels of morbidity, deprivation and ethnic mix (especially London (Jarman and Bosanquet, 1992)), having particular difficulties in responding to imposed organisational incentives - in such areas, whilst access issues such as those outlined above are of relevance, access to quality care continues to be an issue. Observations of this nature have led to a recent call for 'a system in which a national contract specified the minimum quality of care .. supplemented by local contracts that offered incentives to develop better services locally' - an arrangement which might be more sensitive to local difficulties in delivery of care (Heath, 1997).

6.2.1 Recent organisational changes and the accessibility of Primary Medical Care

Substantial changes were effected in the management and delivery of primary care through a new contract for general practitioners which was introduced in 1990 (Department of Health, 1990). The contract aimed to introduce the concept of a market into healthcare provision, to give consumers better choice by providing more information about local services, by increasing competition between providers, and by making it easier to change doctors (Iliffe, 1996). Other aims of the 1990 contract included making the general practitioners' terms of service more specific, making the remuneration system more performance related, strengthening general practitioners contractual arrangements with the Family Health Service Authorities in England and Wales (Health Boards in Scotland), and ensuring greater value for money in the

services provided through general practice. A key element of the 1990 contract was the introduction of a fundholding system which was made available to general practitioners depending on a number of factors, including the size of the practice in which they provided services (initially a lower limit of 9,000 patients was set). In this system, participating general practitioners were granted an annual budget with which they purchased a range of medical care for their patients which included a wide range of specific hospital treatments, most outpatient care, drug costs, and practice staff costs (Lewsey and Smith, 1996). Although few general practitioners willingly accepted the introduction of fundholding, by 1995 the system had expanded to cover 40% of the population.

A wide range of advantages have been claimed for the fundholding system including budgetary flexibility which for one practice at least lead to 'the near elimination of waiting time for elective surgery' (Lewsey and Smith, 1996). Other proponents of fundholding have suggested that the scheme has permitted the consultation of patients in purchasing plans, the provision of an increased range of treatments, 'improved quality', and facilitated the changing of contracts between providers of services (Scott, 1996).

A review of the impact of fundholding is beyond the scope of this present thesis, but for the present purposes it is of importance that some have suggested that the introduction of fundholding has been associated with inequity between patients of fundholding practices compared with those of and non-fundholding practices in relation to the provision of services, access to care, and a number of other commonly adopted markers of 'quality' in relation to the provision of primary care – a two-tiered system of health care. A number of studies have reported cost savings in prescribing practices amongst fundholders when compared with non-fundholders (Maxwell, Heaney et al. 1993; Bradlow and Coulter, 1993), although a recent study (Bateman, Campbell et al. 1996) (challenging the findings of Bradlow and Coulter (1993)) has suggested that prescribing savings can be achieved by fundholding and non-fundholding general practitioners through the use of financial incentive schemes to which both fundholding and non-fundholding general practitioners responded in a similar way.

Despite the suggestions outlined above, there have been no studies which have specifically examined the issue of access to primary care in fundholding and non-fundholding practices. Allegations of inequity in access to care have generally related to investigations of the reported inequity in referral to, and use of secondary care services by fundholding practices when compared with non-fundholding practices. An extensive study by Kammerling and Kinnear (1996) of orthopaedic referral patterns by Avon doctors from 10 fundholding practices compared with 22 control practices, although highlighting differences between the two groups in relation to outpatient referrals, was unable to judge whether the differences observed represented benefits or disadvantages to the patients concerned. Earlier work by Coulter and Bradlow (1993) had found no evidence that the referral behaviour of fundholders was influenced by holding a budget. Indeed, it has been noted that 'the introduction of financial considerations into the British doctor-patient relationship may lead to an erosion of the patient's trust in the doctor's clinical judgements ... patients may question whether they are receiving the best care or the cheapest care' (McQuaide, 1996).

In terms of the framework for considering the accessibility of primary medical care adopted in this thesis, no studies have examined differences between fundholding practices and non-fundholding practices in relation to the geographical accessibility of primary care. Similarly, the impact of fundholding with regard to organisational element of primary care provision has not been examined, although Howie et al (1994) reported that the impact of fundholding over a two year period between 1990 and 1992 had only a marginal effect on mean consultation length (increase from 7.6 to 7.7 minutes) for patients presenting with pain to fundholding doctors from six group practices in Grampian, Scotland. Although satisfaction with the accessibility of primary care was not specifically addressed in that work, patient satisfaction with decisions regarding prescribing, referral, and investigations was observed to remain relatively stable between 1990 and 1992. Howie's work was based on uncontrolled data, and it is of importance to recognise that substantial changes took place in the early 1990s affecting all practices, not just fundholding practices. Since the Grampian studies did not examine changes which might also be occurring in non-fundholding practices, some doubt must be considered to exist in attributing the changes observed (such as the significant reduction in the proportions of patients

having investigations, or being referred to hospital), or indeed the lack of changes (such as the marginal change in average consultation length) to the issue of fundholding rather than to the more general changes taking place across primary care in the early 1990s.

Given these observations, it would be reasonable to conclude that fundholding per se has probably not been associated with a disadvantage in access to care by patients of fundholding practices. The system has been expensive in financial terms, and many would argue has consumed resources which might more effectively have been channelled into patient care. In general terms, it would appear that the holding of a budget for patient care by a group of general practitioners is not associated with substantial improvements in access to care as measured by the length of time spent by patients with the general practitioner. Detailed information is however lacking in relation to the utilisation and uptake of services, patient satisfaction with the accessibility of care, and the geographical accessibility of fundholding compared with non-fundholding practices. One should therefore be guarded in coming to definite conclusions regarding the impact of fundholding on the notion of the accessibility of primary medical care.

6.3 Psycho-social

The delivery of primary medical care has evolved considerably in recent years with a greater emphasis on the functioning of the multi-disciplinary primary health care team, rather than on the contribution made by general practitioners to that team. The distinction between 'general practice' as a clinical discipline as opposed to a 'venue for a team' has been addressed explicitly in a recent report (Royal College of General Practitioners, 1996b) which suggested that 'a healthy organisation (the practice) can only exist when each member of the team is unambiguously important and professionally sound'. The report thus attempted to re-value the role and contribution of nurses and managers (especially) to the multi-disciplinary primary health care team. Recent organisational and contractual changes have seen a substantial increase in the numbers of non-medical professionals to whom patients may have access as part of this team approach. Leese and Bosanquet (1995a) reported a 22% increase in the numbers of practices employing a practice nurse between 1987 and 1995, and a 34% increase in the number of practices employing a practice manager. Fewer

reports are available regarding the increase in the numbers of para-medical clinical staff operating in primary care, although there are believed to be substantial increases in the numbers of counsellors, psychologists, physiotherapists and occupational therapists, especially in fundholding practices who now represent 26% of all practices covering 40%⁶ of the population in England and Wales (Royal College of General Practitioners, 1995c). On this account, many patients now have access to a greater diversity of health care professionals within the primary care setting.

Perhaps the greatest changes in access to primary medical care have been effected through the increasingly sophisticated training programmes for general practitioners which have evolved in the past twenty years (Hasler, 1989) – programmes in which the personal accessibility of the doctor to the patients (the quality of the doctor/patient relationship) has been at the very heart of developments in postgraduate training (Hasler, 1989). Vocational training for general practice is now obligatory for principal general practitioners, and recent years have seen a refinement of general practitioner training schedules and the introduction of summative assessment of registrars at the end of their training, a process incorporating assessment of consulting and investigative skills as well as knowledge using validated procedures (Campbell, Howie et al. 1995; Lough, McKay et al. 1995). Issues relating to doctor style are now therefore beginning to be addressed as part of summative assessment of future general practitioners, although it is probably true to say that what constitutes a 'good' style remains to be defined - it is perhaps simpler to identify approaches to patients that are 'not good'. The assessment of the 'personal accessibility of the doctor to the patient as measured by the quality of the doctor patient relationship is therefore a matter of current scrutiny. Whilst the procedure for summative assessment has been shown to be valid and feasible as demonstrated by substantive levels of agreement between assessors in pilot schedules (Lough et al. 1995; Campbell, Howie et al. 1993), the definition of quality of the doctor patient relationship and the associated personal accessibility issues remain to be clarified. Large numbers of practices are now involved in vocational training of general practitioners, and the patient population of such practices are known to have access to a wider range of better quality care than patients using the services provided by

⁶ (July 1995 Figures)

non training practices (Baker and Thompson, 1995). Baker's study suggested that there was a widening differential between training and non-training practices (between 1982 and 1990) with regard to a number of quality measures of educational and clinical activities, and the authors proposed that future practice based accreditation models should target less developed practices preferentially.

Although continuity of care has been identified as an important positive feature of primary care by patients, researchers, and administrators, there have been few attempts to recognise this on a practical level by its involvement in training schedules at a post graduate level, or in the 'Fellowship by assessment' process of the Royal College of General Practitioners, or in the financial rewards and remuneration provided to general practitioners. Practices providing access to personal continuous care are thus not overtly rewarded for their efforts in this regard. On a similar vein, although Howie and colleagues (Howie et al. 1991) have suggested that the ratio of the numbers of long to short consultations might be a proxy measure for quality of care for general practice, no attempts have been made to incorporate such a measure of quality (if accepted as such) into recognised and implemented performance indicators for general practice (Mair, 1995; Houghton, 1995).

The material factors influencing the accessibility of primary care for the patient have been considered in detail previously, although the UK National Health Service remains largely free at the point of delivery as opposed to the system in many other countries. Poverty however has once again recently been highlighted as the major determinant of health status, and this has been associated with a call for the 'world-wide professional energy (of medicine) to be concentrated on combating the damage done by poverty' (Haines and Smith, 1997). The challenge to poverty in the UK as a determinant of health experience may be aimed at improving the accessibility of high quality primary care to deprived populations, as has been achieved to a limited extent by the targeted resources of the London Initiative Zone which has resulted in a substantial improvement in the quality of care in inner London (Jarman and Bosanquet, 1992), and which might provide a model for use in other areas where poverty and deprivation are prevalent. The accessibility of medical care is however only one (small) facet of the problem of poverty which will require to be challenged from a political and strategic base before significant inroads and improvements can

be anticipated.

General medical practice remains central to the delivery of primary medical care in the United Kingdom. The accessibility of these services is therefore of fundamental importance, and is subject to a wide range of influences. Managing access to such care is one means of attempting to achieve equity in health care, one of the underlying principles of the National Health Service. The studies which follow investigate the accessibility of primary medical care, examining some of the problems, practice and potential of this 'jewel in the crown' of the National Health Service.

Chapter II

Out-of-hours Study

1 Summary

- Out-of-hours contacts represent a small but important component of general practitioner workload. Appointments systems are a means increasingly used for managing access to care, but are frequently reported by patients as a source of dissatisfaction.
- A descriptive study of out-of-hours workload involving prospective data collection was undertaken in one urban practice. The management of patients presenting out-of-hours over a one year study period was examined with regard to (a) the use of telephone advice (b) the influence of the time of contact and (c) the doctor judged necessity of the contact. Using a retrospective analysis of information obtained from patients' records, the impact of management decisions (use of telephone, prescribing of antibiotics) on subsequent consultation patterns was explored for patients presenting out-of-hours with respiratory or ear, nose and throat problems. The relationship between appointment availability and out-of-hours workload was examined over a 31 week study period.
- Twelve hundred and two contacts were recorded throughout the study period, representing a rate at the upper end of previously reported out-of-hours workload information. Although the overall use of telephone advice was similar irrespective of the time of the contact, a wide variation was observed amongst five experienced general practitioners in their use of telephone advice, and some potential influences on such management decisions are considered. A 2.5 fold increase in the likelihood of an out-of-hours contact was observed for days where the appointments system was fully booked at midday prior to the contact time. Patients prescribed antibiotics had a lower reconsultation rate in the seven days following the initial contact when compared with those not receiving antibiotics. However, the difference between the two groups was small, and it was concluded that reconsultation in the seven days following an out-of-hours contact for a respiratory or ear, nose and throat problem (and so influence demand on any appointments system) was only marginally influenced by the decision to prescribe or withhold antibiotics at the initial consultation.
- Appointments systems are a commonly adopted strategy for many practices in managing the time available for interaction between patient and doctor. It would appear that a fully booked appointment system may have important sequelae for the doctor in the form of a risk of increased out-of-hours workload. No similar work has been undertaken examining the relationship between daytime doctor accessibility and out-of-hours workload. A power study based on the results presented suggests that a sample size of approximately 300 consecutive days is required to demonstrate the effect observed of variations in doctor availability on out-of-hours workload assuming a power of 80% and at a level of 5% significance. This study usefully informs the literature in this regard. The possibility that variations in the operation of general practice appointment systems may have potentially important sequelae for patients formed the basis of the next study.

2 Background

Since the inception of the NHS general practitioners have had a contractual obligation to provide 24 hour care for patients who are registered with them. This has proved to be an emotive area for general practitioners, their political representatives, health service managers, central government, and patients. The contract of 1990 introduced changes with regard to general practitioners' obligations in this area, and further important modifications have been made even more recently such as the recognition of the liability of a suitably qualified deputy providing services out-of-hours on behalf of a principal general practitioner.

Contacting a doctor out-of-hours remains an unusual event. On the basis of currently available information, 1,000 patients in general practice might be expected to generate about 4,000 contacts with a general practitioner over a one year period. Only around 175 (4%) of these will take place outside normal working hours. The relative importance of these contacts is, however, disproportionate to their frequency; for many doctors, at least some such contacts represent an inconvenience or irritation, whilst for patients they may represent the occurrence of unusual, severe, or frightening symptoms requiring urgent medical assessment irrespective of the time of occurrence. In an increasingly consumer-orientated society the availability of many domestic services during extended parts of the day might be expected to be matched by patients' expectations for increasing availability of other, more personal services such as those provided by general practitioners

Research into the provision of out-of-hours care has considered a wide range of areas (doctor performance, patient expectations, appropriate structures, health economics etc). Discussion regarding the issue of out-of-hours care within the context of general practice impinges on the other major source of "open access" care - the A&E Department, and the role of such departments in the provision of primary care continues to be debated.

A further area of interest for many general practitioners' concerns the means of providing access to general practitioner services. The increasing use of general

practitioner services following the introduction of the 1948 NHS Act was associated with an increase in the use of appointments systems as a means of administering access to primary medical care. Collings' report (1950), reviewing general practice in England in 1950 described the overall state as 'bad and still deteriorating.' The 'grim analysis' includes a description of industrial practice in which he found

'...a queue of people extending 200 yards up the street, waiting their turn to see one of the (six) doctors; they were standing packed in the waiting room and I had to force an entrance.... I was told, not without pride, that "we have seen 500 already today" during my stay of an hour and a quarter 120 more patients were "seen" by three different doctors'

This situation was typical of general practice following introduction of a nationalised health service, and although the situation had changed dramatically by the 1980s (the vast majority -70-80% in most studies (Wilkin et al. 1987; Ritchie et al. 1981; Cartwright and Anderson, 1981) -of practices by then operating an appointments system), patients in the UK have continued to express dissatisfaction with the accessibility of primary medical care (Consumers' Association, 1993; Consumers' Association, 1983). The sequelae resulting from variations in appointments system operation have been explored in a number of studies with effects being noted on doctor stress (Howie et al. 1992; Chambers, 1991; Wilson, McDonald et al. 1991), continuity of patient care (Freeman, 1989), and waiting times and consultation length (Heaney, Howie et al. 1991; Wilson, 1985), and attempts have been made to explore the situation from the patient's perspective (Noble, 1982). Hughes work (1983) referred to in detail previously has considered the issue of re-consultation in relation to variations in existing consultation arrangements, but that study only indirectly referred to the morbidity profile of the patients seen.

In view of these observations, and in particular the lack of work examining the relationship between in-hours doctor accessibility and out-of-hours workload, it seemed to be of importance to explore the possibility that variations in the operation of appointments systems might be related in some way to the volume of out-of-hours general practice workload. The research questions presented in the following section were examined.

3 Research questions and hypotheses considered

In this study, the appointment system is seen not just as an organisational tool used for the administration of practice workload, but as a dynamic entity whose operation both influences and is subject to workload stresses placed upon it. The central research question addressed is: what is the relationship (if any) between daytime general practitioner accessibility (as measured by appointment availability) and the incidence of out-of-hours contacts? The specific hypothesis considered is:

'that reduced availability of daytime appointments will be associated with a higher likelihood of an out-of-hours contact occurring.'

• *Hypothesis 1*

To address this question, a descriptive study of out-of-hours workload was undertaken examining all out-of-hours contacts in one practice occurring over a one year period, and relating this workload to the operation of the practice appointment system. Reference has been made previously to the variation which has been reported to exist between doctors with regard to their use of telephone advice as the primary means of managing out-of-hours contacts, and also to the potential influence of the time at which an out-of-hours contact is received on the management of that contact adopted by the doctor. Undertaking this work thus gave the opportunity to examine two further issues, both of which relate to the accessibility of out-of-hours care: (i) what is the variation amongst a group of general practitioners in their use of telephone advice as the primary means of managing the contact, and does the time at which an out-of-hours contact is received influence the management of that contact? and (ii) what effect do clinical management decisions made out-of-hours regarding antibiotic prescribing have on subsequent consultation demand (hence influencing pressure on the appointment system). The hypotheses proposed are:

'that general practitioners will vary widely in their use of telephone advice as the primary means of managing an out-of-hours contact'

• *Hypothesis 2*

'that the effect of the time at which a contact is received on the general practitioner's response to out-of-hours requests will vary between individuals'

• *Hypothesis 3*

'that prescribing antibiotics will result in a reduced likelihood of reconsultation (and hence a reduction in demand on the appointments system) in the week following the out-of-hours contact.'

• *Hypothesis 4*

4 Method

4.1 Study setting

The study was undertaken in a practice located in central Edinburgh in an area of mixed economic fortunes. Although sited in close proximity to a long established University with its attendant academic pretensions, much of the nearby housing accommodated city centre dwellers with the associated hallmarks of deprivation, poverty, and inner city urban decay. Unlike many of the practices in Edinburgh, Mackenzie Medical Centre, and other nearby practices, attracted significant deprivation payments at the low and medium levels. Experience, and professional and social contact with other local practices suggested that the practice population of patients was comparable with other local practices. The practice area extended in a one by two miles rectangular pattern from the northern boundary set by Edinburgh's main shopping thoroughfare (Princes Street) through 'old Edinburgh' with its air of history - the Castle, St Giles Cathedral, the Royal Mile, and the Palace of Holyrood; decaying inner city council estates dating from the mid 1960s housing a young deprived majority and an ageing, socially isolated minority; 'smart' tenement flatted

accommodation housing many university students and young professionals but mixed with pockets of council renovated tenement flats with significant numbers of deprived and semi-deprived occupants; and finally, at its southern boundary, substantial semi-detached villas with middle class owner-occupiers.

The practice comprised a combined list size of 5800 patients shared amongst five principal general practitioners. This represents an average personal list size of approximately 1150 patients per principal - significantly less than equivalent Scottish figure of c.1750. This difference is accounted for by the part-time clinical commitment of all the principals on account of teaching and research commitments within the University of Edinburgh Department of General Practice. For the five individuals involved, their respective clinical commitment at the time of undertaking this study was 70, 60, 60, 50 and 30% of a full time clinical commitment. A clinical assistant was also in post with a clinical commitment of 80% of a three-quarter time contract, and three full time trainee general practitioners were attached to the practice throughout the study period. All fully qualified general practitioners were judged to be 'experienced'. All of the doctors (except the individual with a 30% clinical commitment) shared in the practice out-of-hours rota. One doctor undertook a half share in the out-of-hours rota, the others contributed equally. The practice out-of-hours commitment was resourced in-house with telephone calls being initially handled by a commercial answering service using trained reception staff to deal with calls. Calls requiring medical advice were passed to the on-call doctor who then decided whether to (a) return the patient's telephone call offering advice, a visit, or other courses of management not involving direct face to face patient contact, or (b) to visit the patient without further pre-visit assessment of the contact.

4.2 Out-of-hours workload, the use of telephone advice, and time as a factor influencing the management of out-of-hours patient contacts.

A prospective study was undertaken with standardised information being collected on each out-of-hours contact occurring during 1989. "Out-of-hours" was defined as patient contacts made between 1800 hours (weekdays) and 0830 the following morning. Contacts between 1200 hours on Saturday and 0830 hours on Monday

4.3 Daytime appointment availability and out-of-hours workload

Information on doctor appointment availability was collected from examination of the surgery appointment book at midday for 31 consecutive weeks (156 weekdays) during 1989. Each day, reception staff noted whether any routine appointments remained unbooked at midday for afternoon consulting sessions. This dichotomised (yes/no) measure of appointment availability was compared with the "risk" of an out-of-hours contact occurring (or not) during the following evening or night by relating the daytime appointment availability measure to the out-of-hours workload measures described previously. The period of study selected commenced at the start of the 1989 calendar year, and continued through to mid summer. Since data were collected by reception staff, their request to terminate data collection after the consecutive 31 week period was accepted on the basis that such a period seemed likely to give a reasonable 'snap shot' estimate of appointment availability even accounting for seasonal variations in workload. No studies have previously reported data for seasonal variations in appointment provision, and so the 31 week sample must be considered a pragmatic sample balancing compliance with data collection with monthly/seasonal variations in practice organisation and administration especially in relation to appointment system operation.

4.4 Reconsultation following, and antibiotic prescribing in Respiratory / ENT illness presented out-of-hours

Patients where a principal diagnosis of a respiratory or ear, nose and throat condition had been made at the initial out-of-hours contact were identified in early 1990, and their notes examined with regard to (a) their consultation pattern in the seven days following the initial contact and (b) antibiotic prescribing in the seven days following the initial out-of-hours contact.

4.5 Analysis

Outcome measures were explored in relation to the following potentially explanatory variables:

• <i>Principal Outcomes</i>	• <i>Explanatory</i>
Out-of-hours workload	Midday appointment availability
Use of telephone management	Interdoctor variation
	Time of contact
Reconsultation in seven days following initial out-of-hours contact for respiratory/ENT problem	Patient age
	Antibiotic prescribing at initial contact
Change in treatment regime	Antibiotic prescribing at initial contact
Doctor judged necessity of contact	Doctor experience

These analyses were undertaken to address the specific aims outlined previously. The frequency of use of telephone advice as the primary management option adopted was compared between doctors for contacts received between 1800 and 0830 hours. These hours were selected for study since information was available for these times for all days of the week. Where statistical analysis was undertaken, caution was taken with regard to assumptions regarding the distribution of variables, and parametric as well as non-parametric techniques were employed as appropriate.

Differences in out-of-hours visiting patterns were described by examining the proportion of contacts where telephone advice was adopted as the primary means of management during day, evening or night out-of-hours contacts; varying patterns of management of out-of hours contacts in these time intervals were compared using Pearson's chi squared test. Pearson's chi squared test was also used to compare referral patterns for patients with respiratory or ENT morbidity compared with patients with other morbidity. The differential influence of the time at which a contact was made on the subsequent management of the contact was compared for three doctors using bar charts illustrating the doctors' responses at various times, and calculation of chi-squared statistic for trend across the time intervals. The proportion of patients receiving antibiotics for the treatment of respiratory or ENT illness was compared between age groups using the Mann Whitney U test. The association of a fully booked appointment system with subsequent out-of-hours workload was examined using Pearson's chi squared test with presentation of the relevant odds

ratio and confidence intervals. A similar approach was adopted when considering the likelihood of reconsulting following an out-of-hours contact where an antibiotic was or was not prescribed for the treatment of respiratory or ENT morbidity. Unless otherwise stated, a significance level of $p < 0.05$ has been adopted. Statistical analyses were carried out using SPSS-PC (SPSS Inc, 1990).

5 Results

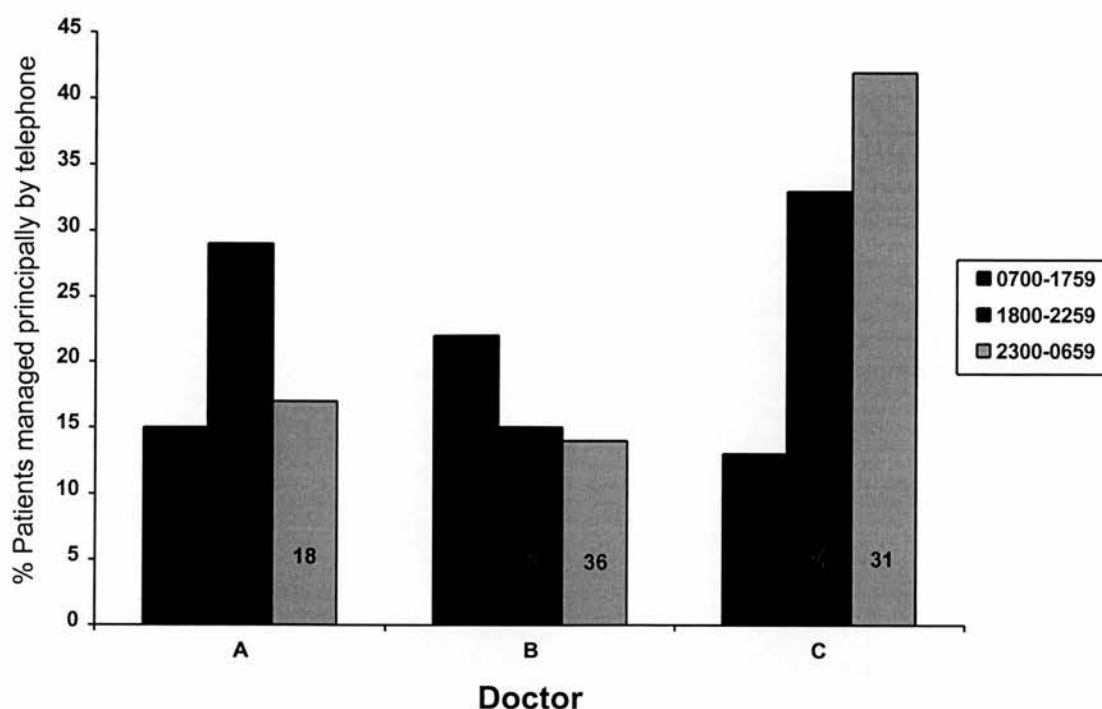
5.1 Out-of-hours workload, the use of telephone advice, and time as a factor influencing the management of out-of-hours patient contacts.

During the one year study period, 1202 out-of-hours contacts (Table 6) were received by doctors, representing an overall rate of 209/1000 registered patients for the average of 5800 patients on the practice list during the study period. 12 had missing information on contact time, and were excluded from the study. There was no significant difference between daytime (0700-1759 hrs) evening (1800-2259 hrs) and night (2300-0659 hrs) contacts in the proportion of contacts in which telephone advice was used as the principal means of management (chi squared 1.56, df 2, $p=0.46$). Contacts were managed by 8 doctors during this time (5 principals, 3 trainees, average 152 contacts per doctor, range 82-201). 802 contacts were received between 1800 and 0830 hours.

Time Of Call	Telephone Advice Only	Visit	Total
• Daytime (0700-1759)	69 (15)	393 (85)	462 (100)
• Evening (1800-2259)	94 (18)	432 (82)	526 (100)
• Night (2300-0659)	35 (16)	179 (84)	214 (100)
TOTAL	198 (16)	1004 (84)	1202 (100)

*Table 6 Management of 1202 out-of-hours contacts during 1989 in study practice
(% across row).*

For contacts received between 1800 and 0830, the majority of patients (671/802, 84%) received a visit following the contact. The remaining 137 (16%) were managed principally by the use of telephone advice, but this overall mean conceals a wide variation both amongst the five experienced doctors (range 5% to 27%) and three general practitioner trainees (range 5-20%) in the use of telephone advice.



		0700-1759	1800-2259	2300-0659	χ^2 trend
A	Telephone	6	8	3	0.18, p=0.67
	Visit	34	23	15	
B	Telephone	18	12	5	1.37, p=0.24
	Visit	65	66	31	
C	Telephone	9	27	13	11.5, p<0.001
	Visit	62	58	18	

Figure 4 The influence of time of contact on the proportion of calls managed by telephone advice. Patterns for three doctors. Internal numbers in figure are the total number of patient contacts in that time period for each doctor. Raw data provided in table which presents chi squared for trend for use of telephone advice across three time intervals for each of the three doctors.

Amongst this relatively small group of doctors, the time at which the contact was made was a variable in the subsequent management of the contact (Figure 4); the effect, however, was not consistent, with some doctors being more likely to use

telephone management during the night whilst others were clearly less likely to behave in this way. Whilst only Doctor C demonstrated a trend across time that was statistically significant, it seems reasonable to suggest that the trend for Doctor B is probably not the same as that for C and is probably opposite in effect. Doctor B appeared less likely to use telephone advice for patients making contact between 2300 and 0659 (14% of contacts managed by telephone) than for contacts received during the day (22% telephone management). In contrast, Doctor C used telephone management for 13% of daytime contacts, but 42% of night contacts. Doctor A would appear to represent an intermediate pattern.

5.2 Daytime appointment availability and out-of-hours workload

Information on doctor availability (measured by the presence of any unbooked appointments at midday) was collected systematically for the first 156 weekdays in 1989, and compared with out-of-hours workload during the same period. The results (Table 7), although not achieving statistical significance, suggest that when no appointments are available at midday for that day, the doctor on call that evening was more than twice as likely to be disturbed as on days when appointments are available (24 / 107 days with no subsequent out-of-hours contact compared to 5/49; odds ratio 3.3, 95% confidence interval 0.8-8.2).

	Out-of-hours contact the following evening/night		Total
	Yes	No	
Midday appointment availability	5 (10)	44 (90)	49 (100)
	24 (22)	83 (78)	107 (100)
Total	29 (19)	127 (81)	156 (100)

Chi squared 3.3, df 1, $p = 0.07$, odds ratio 2.5, 95% confidence interval 0.8-8.2

Table 7 Daytime appointment availability and out-of-hours workload for 156 weekdays

5.3 Reconsultation following, and antibiotic prescribing in Respiratory / ENT illness presented out-of-hours

During 1989, 1202 patient - doctor contacts were made out-of-hours. Of these, 391 (32%) had a primary diagnosis of respiratory or ear, nose and throat problem of whom 349 (89%) received a visit. No follow up data were available for 24 (6%) of these patients because 17 had left the list, 1 had died, and 6 were unaccounted for (possibly temporary residents with no adequate record of follow up consultation pattern). 23 (6.6%) of 349 patients visited with a primary respiratory/ENT diagnosis were referred to hospital for a second opinion or admission compared with 88/317 (27.8%) of patients visited on account of any other diagnosis (Chi squared 52.1, df 1, $p < 0.001$, odds ratio 0.18, 95% confidence interval 0.11, 0.31).

Antibiotics were prescribed to 192 patients (49%) at the initial consultation, with variation amongst the five fully trained doctors in prescribing antibiotics from 21% to 66% of cases visited. Three trainee doctors prescribed antibiotics on 47%, 54%, and 58% (mean 53%) of occasions respectively. Doctors visited 349 out of 392

patients (89%, range for individual doctors, 79-100%) with respiratory/ENT illness presenting out-of-hours (Table 8) compared with 81% (666/822) for all other contacts received out-of-hours (Chi squared 11.8, df 1, $p < 0.001$).

Time of call	Telephone advice only (%)	Visit (%)
0700-1759	21 (12)	152 (88)
1800-2259	16 (10)	150 (90)
2300-0659	5 (12)	47 (88)
Total	42 (11)	349 (89)

Table 8 Response of doctor to 391 out-of-hours contacts by patients with respiratory/ENT illness by time of call.

A significant association between patient age and prescribing of antibiotics in ENT illness is demonstrated in the results presented in Table 9. Age did not appear to influence antibiotic prescribing policy in "respiratory illness" analysed separately from ENT illness.

initial out-of-hours contact (odds ratio 0.60, 95% confidence interval 0.39, 0.96). Furthermore, it would also appear that the reduction in reconsultation is due to an antibiotic having been prescribed rather than the fact that a visit took place - the reconsultation rate was similar for patients whether they were visited or not.

Initial consultation	Follow up consultation		Total
	N (% across row)		
	Seen within seven days	Not seen within seven days	
No antibiotic prescribed	62 (42)	87 (58)	149
Antibiotic prescribed	55 (30)	127 (70)	182
TOTAL	117	214	331

(Chi squared 4.7, df 1, p=0.03, odds ratio 0.60, 95% confidence interval 0.39, 0.96)

Table 10 One week follow up data for 331 patients visited out-of-hours with a primary respiratory or ENT diagnosis, by whether or not an antibiotic was prescribed at the initial contact

The pattern of consulting for 113 patients who re-consulted within one week of the initial consultation is depicted in Figure 5. There is a tendency towards two peaks in this distribution at 1-2 days and 5-6 days after the initial consultation.

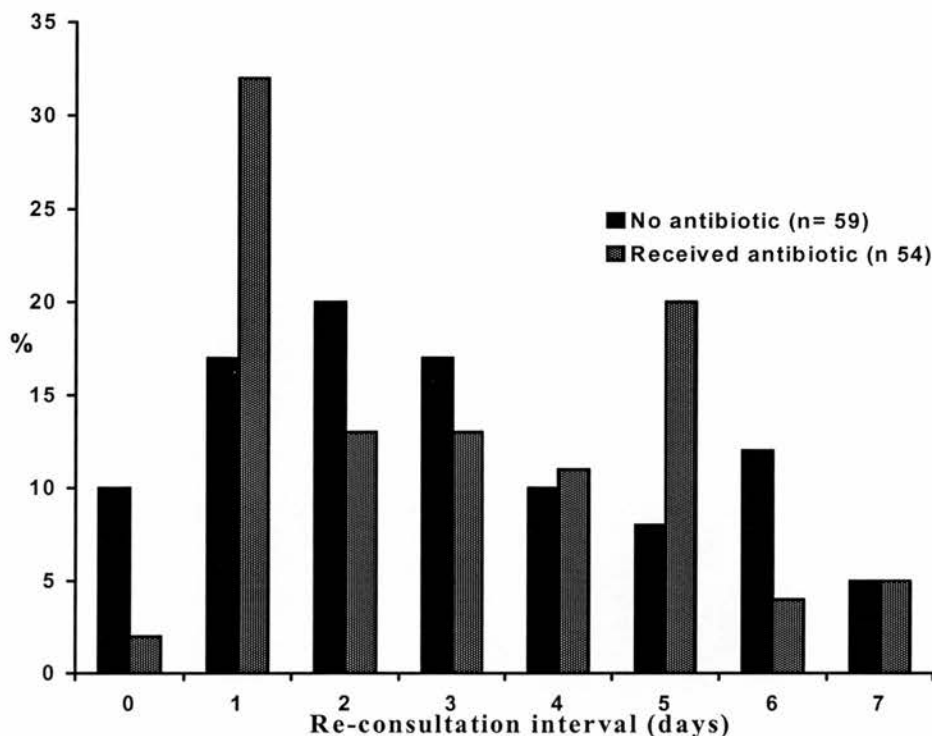


Figure 5 Re-consultation interval (days) after initial out-of-hours visit for 113 patients with respiratory/ENT illness

Of 117 patients seen in the 7 days following the initial out-of-hours contact, 62 (53%) had not received an antibiotic (Table 11). Of these 62 patients, 17 (28%) received an antibiotic at the second consultation compared with 12 of the 55 patients (22%) who had received an antibiotic initially (Chi squared 0.56, df 1, $p=0.45$). It thus appeared that the prescribing of an antibiotic to patients presenting out-of-hours did not influence the subsequent pattern of antibiotic prescribing in the seven days following the initial out-of-hours contact

INITIAL CONSULTATION	FOLLOW UP CONSULTATION		TOTAL
	N(% across row)		
	No antibiotic prescribed or changed	Antibiotic prescribed or changed	
No antibiotic prescribed	45 (72)	17 (28)	62
Antibiotic prescribed	43 (78)	12 (22)	55
Total	87(74)	29(26)	117

(Chi squared 0.49, df 1, p=0.48, odds ratio 0.74, 95% confidence interval 0.29-1.87)

Table 11 Antibiotic prescribing: initial out-of-hours visit and follow up consultation for 117 patients seen within one week of original contact

Significant differences existed between patients in different age groups with regard to re-consultation pattern within 7 days of an out-of-hours contact for a respiratory/ENT problem (Table 12). Younger patients re-consulted significantly less often than did older patients. This difference is not accounted for by variation in antibiotic prescribing policy as

AGE	NOT SEEN	SEEN
(years)	WITHIN 7 DAYS	WITHIN 7 DAYS
	N(% across row)	N(% across row)
0-4.9	109 (69)	48 (31)
5-9.9	34 (79)	9 (21)
10-19.9	19 (70)	8 (30)
20-39.9	26 (55)	21 (45)
40-59.9	15 (44)	19 (56)
60+	31 (53)	27 (47)
TOTAL	234 (64)	132 (36)

Mann-Whitney U=174, p<0.02

Table 12 One week follow up data for 366 patients contacting out-of-hours with a Respiratory/ENT problem by age group of patient (years)

patients in all age groups received antibiotics on approximately the same number of occasions (mean 55%, chi squared 2.23, df 5, p=0.81). There is however a significant difference in morbidity pattern which appears to be age related (Figure 6), older patients having a higher proportion of "respiratory" as opposed to ENT illness.

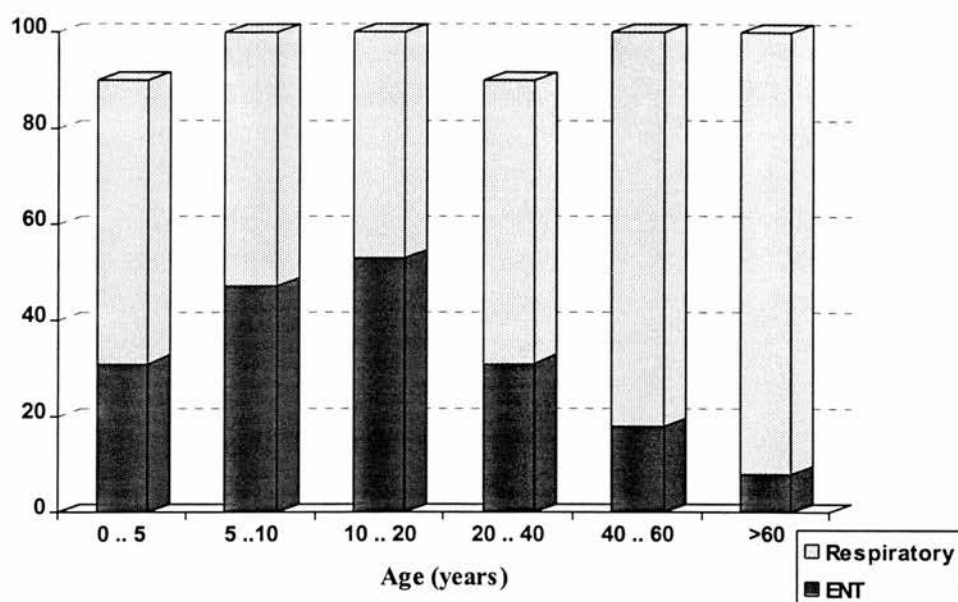


Figure 6 Relative contribution of respiratory and ENT illness by age-group of patients visited out-of-hours. (N=331)

Amongst five trained doctors (excluding deputising service doctors), all contacts with patients with respiratory/ENT illness were judged of doubtful necessity on 75 occasions (31%, n=239) and for three trainee doctors on 17 occasions (17%, n=99; difference between groups chi squared 14.8, df 7, $p < 0.02$). Visits actually done were regarded by trained doctors as of doubtful necessity in 50/28 (24%) of cases and in 14/92 (15%) of cases by trainee doctors (difference between trained and trainee doctors not significant). For visits judged of doubtful necessity (n=64), antibiotics were prescribed on 18 (28%) of occasions, whereas for visits judged necessary (n=136), antibiotics were prescribed on 80 (53%) of occasions (chi squared 20.6, df 2, $p < 0.0001$). There was no association observed between reconsultation rates in the 7 days following an out-of-hours presentation with respiratory/ENT morbidity and the perceived necessity of the patient contact (Table 13).

Doctor perceived necessity	Not seen within 7 days N(% across row)	Seen within 7 days N(% across row)	Total N(% within column)
Doubtful necessity	43 (69)	19 (31)	62 (23)
Intermediate	57 (70)	24 (30)	81 (30)
Necessary	79 (61)	50 (39)	129 (47)
TOTAL	179 (66)	93 (34)	272 (100)

(Chi squared 2.3, df 2, p 0.32)

Table 13 Doctor perceived necessity as a predictor of subsequent consultation pattern for 272 patients visited out-of-hours with respiratory/ENT illness during 1989

6 Discussion

6.1 Methodology

This study explored prospective data collected in relation to out-of-hours contacts with one practice during 1989. A one year period was selected for investigation following an examination of the relevant literature on out-of-hours workload in general practice. Some studies have examined out-of-hours workload over less than two months whilst others have examined comparative data from several years. A one year period of investigation was chosen, on the basis that this would take into consideration any seasonal variations which might exist in workload or in patterns of morbidity which might influence the use of antibiotics, and since such a period seemed broadly in line with the study periods of similar investigations of workload reported in the literature where workload has been measured over periods from 45 days (Fairley, 1986) to comparative data from several consecutive years (Grundy-Wheeler, 1991). Whilst the use of a shorter period of investigation might have had practical advantages from the point of view of compliance with data collection,

seasonal variations in morbidity could best be accounted for by using a one year minimum period of investigation.

Studies (to be referred to in detail later) have also used a variety of sampling frames to examine out-of-hours workload. Some studies report the workload of a *single general practitioner* whose work forms only part of total practice out-of-hours workload, others examine the out-of-hours work of *whole practices*, or of *several geographically related practices*. A further variable relates to the use of *total out-of-hours workload* accounting for the use of all out-of-hours services by patients (for example including Accident and Emergency attendances by patients), whilst others (the majority of studies) examine only *out-of-hours contacts with general practitioners*. Finally, some studies have examined the out-of-hours workload of *general practitioner cooperatives* – groups of general practitioners providing services on a co-operative and shared basis, sometimes to large sections of the population. Since this study aimed to examine the relationship between appointment availability and out-of-hours workload, and since no similar work had previously been reported, it was decided to undertake a census survey of the out-of-hours workload of all general practitioners contributing to the out-of-hours rota for one general practice. It was judged that this approach represented a reasonable compromise between the examination of only one general practitioner's workload, and a consideration of the workload of several general practitioners from multiple practices.

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Using the information obtained, it is possible to calculate the sample size required to demonstrate the observed differences, assuming that the effect size observed (odds ratio of 2.5) over the 156 days study period is a reasonable approximation to the ‘true’ effect of non-availability of appointments at midday on out-of-hours workload the following evening/night. Based on the data presented in Table 7, page 115, the standardised difference (Altman, 1991 page 457) can be calculated as follows where:

$$\begin{aligned}
 p_1 &= 0.22 \\
 p_2 &= 0.10 \\
 \bar{p} &= (p_1 + p_2) / 2 \\
 &= 0.32 / 2 \\
 &= 0.16
 \end{aligned}$$

then

$$\begin{aligned}
 \text{Standardised difference} &= \frac{p_1 - p_2}{\sqrt{\bar{p}(1 - \bar{p})}} \\
 &= \frac{0.22 - 0.10}{\sqrt{0.16 \cdot (1 - 0.16)}} \\
 &= \frac{0.12}{\sqrt{0.134}} \\
 &= 0.327
 \end{aligned}$$

Using Altmans nomogram (Altman, 1991 Figure 15.2 page 456), and assuming a power of 80%, a sample size of approximately 300 consecutive days is required to demonstrate this effect at a 0.05 level of significance. This compares with the sample size of 156 study days which was available for this study, in which a significance level of 0.07 was observed (Table 7). Whilst the available sample size was smaller than would have been desirable, no similar study has previously been carried out, and thus the present work usefully informs the literature in this regard.

The practice in which the work was carried out was atypical in respect of the numbers of doctors available to treat patients rather than in respect of the administrative arrangements in the operation of the practice appointments system. The above average ratio of doctors to patients (5 principal general practitioner, 3 trainees for 5800 patients; equivalent figure for Scotland 3 principal general practitioners) was a reflection of other commitments undertaken by the doctors in respect of medical academic activities. Correcting for this anomaly reveals that the needs of the 5800 patients were served by approximately 3.5 full time GP Principal equivalents - approximately in line with prevailing Scottish norms (1660 patient per full time equivalent principal general practitioner compared with average Scottish list of 1750 patients per full time equivalent principal general practitioner). The above average ratio of doctors to patients overall, and the essentially part-time nature of the

medical care provided by the trained general practitioners created specific problems in relation to provision of continuity of care. Such problems have been reported (Freeman and Richards, 1993; Freeman, 1989; Freeman, 1987; Freeman, 1986) to be associated with difficulties in provision of appointments, and in differences between patients with regard to satisfaction with the consulting arrangements (both measures being adversely affected in situations where there was a lack of personal continuing primary care). A further anomaly in relation to the study practice derives from its looser partnership on account of its academic base. A similar arrangement exists in five University departments of general practice/primary care (Edinburgh, Southampton, Cardiff, Manchester, UMDS) all of which have slight variations in the organisation and administration of the clinical base associated with the University department. In this setting, the practice was closely associated with the University of Edinburgh Department of General Practice which is jointly staffed by academic general practitioners providing clinical services in the practice, and teaching and research activities in the University Department.

Completeness of data collection was monitored by follow up of 3 weeks' records of patient contacts with the doctors' answering service during the study period.

Completeness of information was important not only in respect of the present study, but also for completeness of the patients' medical records (out-of-hours sheets being filed in the patients' notes) and for recovery of fees due in respect of visits undertaken.

The data collection instrument was developed for this study, and modified in the light of results from a pilot study examining its ease of use. That the form *was* easy to use was suggested by the observation (after checking each sheet visually for legibility) that records were nearly all complete. The measure of availability adopted was the dichotomised (yes/no) response to a question regarding the presence of any unbooked routine appointment (for that afternoon) at midday prior to an out-of-hours contact period. Reception staff recorded this information in the appointments book. The necessity of the out-of-hours contact was assessed by the participating doctors, and so represents only the doctor's opinion regarding the contact. A recent consumers report on out-of-hours care noted that whilst "the GP out-of-hours service is not a night and weekend of the general medical service provided by GPs during the

day. It is a service for medical emergencies ... the trouble is that the definition of what constitutes an emergency is not always clear .." (Consumers' Association, 1998). It is recognised that doctors and patients may differ in their assessment of the need for medical contacts (Fishbacher and Robertson, 1986), and it would be of value to consider an assessment of the patients' views regarding the necessity of the contact in future work of a similar nature.

Morbidity coding with regard to out-of-hours presentations involved attribution of a diagnostic rubric to the consultation record by the doctor involved. Each record was then reviewed by myself and diagnostic rubrics were classified according to the principal system involved. This two stage process may be a source of inaccuracy which should be considered when interpreting results. Development of this methodology would necessitate careful validation of this part of the methodology; this was not undertaken at this stage.

6.2 Out-of-hours workload

6.2.1 Demand

The out-of-hours workload recorded (annual rate of 209 out-of-hours contacts per thousand registered patients) was similar to other reported results (Table 14 and Table 15). Out-of-hours contact rates per thousand registered patients per year have been reported within the range 96 (from a population of mixed social class in urban Cambridge or semi-rural Newmarket) (Perry and Caine, 1990) to 214 (suburban semirural Southampton including cover for local casualty department) (Pitts and Whitby, 1990) and 219 (inner city east London) (Livingstone, Jewell et al. 1989). Scrutiny of these studies and the related out-of-hours literature reveals some of the pitfalls in coming to conclusions regarding performance where a variety of workload measures have been adopted. The principal measures used relate to either "out-of-hours"⁸ or "night"⁹ contacts or visits, and the increasing out-of-hours workload for general practitioners since 1967 has been noted in an extensive review article of the out-of-hours literature (Hallam, 1994).

⁸ Usually defined as 1800 hours weekdays, weekends from 1200 Saturday to 0830 Monday, and public holidays.

⁹ Times when visits (not simply contacts) attract a night visit payment fee. Prior to the 1990 contract this was between 2300-0700 hours, with modification in 1990 to 2220-0800.

Year	Author(s)	Setting and design of studies(s)	Relevant results
1983	Ridsdill Smith RM	Kent 1 general practitioner covering 11,922 patients between 1830-0830 (weekdays), and 1200 on Saturday - 0830 on Monday, and 0700-0830 next day for bank holidays. Use of telephone advice is explored. On call GP covered 28.7% of all on call.	Total of 173 contacts/1000 registered patients per year; 124 visits per 1000 registered patients per year. 16 night contacts per 1000 registered patients per year with 8 night visits per 1000 registered patients per year and 8 telephone contacts per 1000 registered patients per year (? night telephone) Represents 255 out-of-hours contacts to under 15 year olds (doctor made 177 visits). 297 out-of-hours contacts and 206 out-of-hours visits for patients under 15 (both per 1000 registered per year). Number of patients aged under 15 equals 2991 out of 11,922 practice population.
1985	Usherwood T.	Inverclyde, 10 practices in one health centre.	Average of 35.2 night visits per 1000 registered patients per year (25.8 to 43.5 for 10 practices).
1985	Walker, RD.	Study of out-of-hours visits (that is 1800-0830 weekdays, weekends, bank holidays). 10,500 patients in one practice with five principals and one trainee, comprising 1490 children aged less than 15.	510 visits per 1000 registered patients per year with 710 per 1000 registered per year for children under 15 - these figures represent all times including daytime. 1463 out-of-hours visits made (139 per 1000 registered per year), which include 336 out-of-hours visits to children less than 15 (representing 225 per 1000 registered children under 15 years per year).
1986	Fairley, R.	Study examined 45 days, and studied population of 5,300 patients from one middle class practice near Stirling. Considered contacts between 1800-0900.	39.8 visits per 1000 registered patients per year between 1800-0900, with a further 23.0 accident A&E attendances in the same time frame, and 9.2 visits per 1000 registered patients per year between 2300-0700.
1987	Marsh GN, Horne RA, Channing DM	Study considered out-of-hours workload of 2 out of 5 doctors from one practice over a one period in Stockton-on-Tees. Study population was 15,569 patients.	129.9 contacts per 1000 registered patients per year, with a telephone rate of 76.1 (59%); Visits 47.5 (37%), and surgery attendances 6.3 (5%). Late visits (2300-0700) 23.4. per 1000 registered patients per year, with a telephone rate of 13.6, visit rate of 9.8, and under 5 contact rate of 622.5 per 1000 registered under five's per year. Upper respiratory infection on account of 142 out of 809 contacts (17.6%) of whom 70% received telephone advice and 76 out of 809 (9.4%) received an antibiotic. For patients receiving telephone advice (? respiratory infection ??) 55% re-consulted within 7 days.
1989	Livingstone, AE,	Presented figures for 1987 and 1988, but these figures are	Two recorded 219 contacts per 1000 registered patients per year, with

	Jewell JA, Robson J. et al	presented combined in this table. Study examined all out-of-hours contact for weekends, bank holidays and 1830-0830 weekdays from two practices (eight doctors) in East London.	visiting rate of 130, and telephone rate of 53. 32 night contacts per 1000 patients per year, with a night visiting rate of 19 per 1000 patients per year and night telephone advice rate of 13.2 per 1000 registered per year.
1990	Orr A. et al	Study from Montrose.	Recorded rate of 299 per 1000 registered patients per year, out-of-hours contact, this included casualty attendances. A visiting rate of 185 per 1000 registered patients per year included casualty. Night contact of 53 per 1000 registered patients per year with night visiting rate of 31.
1990	Perry JR and Caine N.	The study examined out-of-hours contacts from three practices (7 general practitioners) in Cambridge. Study period was three months, with night visits being defined as 2300-0700.	Recorded 368 contacts for 15,635 patients (this figure being derived from the average list per general practitioner multiplied by 7). An annual rate of 95.8 contacts per 1000 registered patients per year and visiting rate of 76.3 per 1000 registered patients per year (a total of 293 visits). The average visiting rate for 7 general practitioners was 80% (66 - 89%). For under fives, no denominator was available, but a high number of contacts was reported with a visiting rate of 72%.
1990	McCarthy M and Bollam M.	The study considered work of 77 doctors from 13 practices in North London who generated 970 contacts between January and June 1986. No patient denominator is available, and therefore no rates per 1000 registered patients can be expressed.	Telephone advice rate of 37% was recorded (5-57% for the 13 practices) average of 12.2. (3.5-21.4 for 13 practices) calls per general practitioner in the practice. Use of telephone - day time contacts (39%), evening time contacts (47%).
1990	Pitts J and Whitby M.	Study of suburban, semi-rural practice near Southampton examining out-of-hours workload including casualty workload by one practice. A twelve month study period of 1988 to 1989.	Is recorded 273 contacts per 1000 registered patients per year (214 when casualty workload excluded). Generated 152 visits per 1000 registered patients per year (excluding casualty, 107). 44% of all contacts managed by telephone advice. For night visits (excluding casualty workload), 37 contacts per 1000 registered patients per year, with visiting rate of 20 per 1000 registered patients per year. Overall use of telephone equals 46%, and doctor visiting rates vary between 41-78%. Trainees visited more often than principals. Tables 2 and 3 give good comparative data for 1973 - 1987.
1991	Grundy-Wheeler NJ	Study from an army practice of 9000 patients with 2000 patients aged under twelve. Unusual practice. A controlled educational intervention started in January 1985, and comparative data is provided for 1984,85,86 of our of hours workload (1700-0730). In this situation patients generally	1984 : 170 contacts per 1000 registered patients per year. 1986 : 110 contacts per 1000 registered patients per year. Actual figures are provided for under five contact, but no denominator is provided.

		attended an out-of-hours centre (there were few home visits).	An overall fall in out-of-hours contact rate of 40% was recorded.
1993	Carlisle RD, et al	19 month study of one practice covering 29 electoral wards. Out-of-hours contact rates from 15 wards where more than 250 patients were registered was examined. List size 12,000. Data recorded from 588 nights. List size of 12,000 included 803 children under five. Study focused on late contacts (2200-0800).	Records rate of 19.6 to 55.3 per 1000 registered patients per year between the 15 wards. Late contact rates varied with Townsend and unemployment rate, but not with the relevant Jarman score. 33.2 night visits per 1000 patients per year (equivalent to 688 visits in the 588 night study period). For under fives: 149 visits during the 588 nights equivalent to a night visiting rate to under fives of 115.6 per 1000 registered under fives per year.
1994	Hallam L	Review article documenting 5 studies between 1987-1989.	Records range of 130 to 176 out-of-hours contacts per 1000 registered patients per year.
1997	Jessop L et al	Survey of 98 general practice out-of-hours cooperatives	20-256 general practitioners in 98 co-operatives (mean 82, median 67) 10-65% of contacts managed by telephone advice (median 38%) 5-70% contacts managed by 'base visit' (median 30%) 10-80% contacts managed by home visit (median 33%)
1997	Salisbury C	Observational study of a general practice out-of-hours co-operative. Comparison of co-operative with deputising service in 2 areas of London	Co-operative visited 32.0%, telephone advice 57.8%, base visit 7.1% (n=3920) compared with 76.3%, 19.3%, 0.0% for deputising service (n=1892)

Table 14 Summary notes of recent literature relating to general practitioner out-of-hours workload

Year	Reference	Children	Out-of-hours				Late contacts		All telephone rate
			All contact rate	All visit rate	All telephone rate	%telephone	All contact rate	All visit rate	
1983	(Ridsdill Smith, 1983)		173	124			16	8	
1985	(Walker, 1985)	<15's 225 (visits) <5's 24 (night visit)							
1985	(Usherwood, Kapasi et al. 1985)							35	
1986	(Fairley, 1986)							9	
1987	(Marsh et al. 1987)	<5's 622 (ooh contact)	130	48	76	59	23	10	14
1988	(Hobday, 1993)		138	36	102	74		6	10
1989	(Livingstone et al. 1989)		219	130	53		32	19	13
1989	(Campbell, 1990)		209						
1990	(Orr, MacNeill et al. 1990)						53	31	
1990	(Perry and Caine, 1990)		96	76		20			
1990	(McCarthy and Bollam, 1990)					37			
1990	(Pitts and Whitby, 1990)		214	107		44	34	17	4
1991	(Grundy-Wheeler, 1991)		110-170						
1993	(Carlisle, Johnstone et al. 1993)	<5's 116 (night visit rate 2200-0800)						33 20-55 in 15 wards	
1994	(Hallam, 1994)		130-176						
1997	(Jessopp, Beck et al. 1997)					10-65			
1997	(Salisbury, 1997a)					57.8			

Table 15 Summary extract of workload data from recent out-of-hours literature

6.2.2 Deprivation or Expectation?

The principal factors accounting for variations in out-of-hours workload in published data continue to be debated. One such factor may be that of the deprivation level of the population to which out-of-hours services are being provided. Whilst this study was carried out in an area of deprivation (15% of patients on the practice list attracting some deprivation payment compared with 8% for Lothian as a whole), the relationship between deprivation, expectation and demand for out-of-hours patient services remains unclear (Hallam, 1994; Carlisle et al. 1993; Pitts and Whitby, 1990). Carlisle, Johnson and Pearson (1993) examining the impact of deprivation on the night visiting rate in general practice in Nottinghamshire controlled for some of the methodological problems by examining out-of-hours (night hours) workload for one large practice having at least 250 patients in each of 15 wards with varying levels of deprivation. A 2.8 fold variation between wards was demonstrated, and a significant association between car ownership, owner occupation, overcrowding, and unemployment and night visit rates reported. (Interestingly, a similar result has recently also been reported from Nottinghamshire regarding the effect of deprivation on general practitioner medical and surgical new referral rates where deprivation scores (Jarman underprivileged area scores) were the strongest predictor of referral rates to 19 hospitals from 183 local practices (Hippisley-Cox, Hardy et al. 1997).

In contrast, Pitts and Whitby (1990) have suggested their practice's relatively high out-of-hours workload (in an area of comparative affluence in Hampshire) is due to patients having high expectations of 24 hour care. They do not however provide any research evidence to support this suggestion. Others (Orr et al. 1990) have quoted similarly high out-of-hours contact rates, and supported the idea that *expectation* rather than deprivation is a significant factor in determining out-of-hours workload. Direct comparison of figures presented is not possible however as both of these latter studies include casualty work, and were carried out in rural settings. It is of interest to compare the studies by Orr et al (Orr et al. 1990) and Usherwood (Usherwood et al. 1985), both studies being carried out in Scottish coastal towns, but the latter having high deprivation compared to the former. With this observation, the presence of similar night visiting rates adds weight to the suggestion that deprivation *per se* is of less importance than other factors in determining out-of-hours workload.

6.3 Management of out-of-hours contacts

There was an overall consistency in this study in the use of telephone advice irrespective of the time at which contacts were received (15% (daytime contacts) to 18% (evening) and 16% (night)). Previous studies have reported similar rates of telephone advice for night calls compared with all calls (both 58%) (Marsh et al. 1987), and for evening (42%) and night (34%) compared with out-of-hours daytime contacts (35%) (McCarthy and Bollam, 1990). Livingstone et al (Livingstone et al. 1989), reporting on data obtained from East London attribute their “relatively low” use of telephone advice overall (24% of all out-of-hours contacts) to a lower threshold for visiting in deprived areas, and such a hypothesis would be compatible with the results presented here.

Wide variation existed amongst five experienced general practitioners in their response to out-of-hours contacts. Despite broadly similar patterns of out-of-hours morbidity seen by these doctors and a similar distribution of contact times, the overall average of 16% of contacts managed by telephone advice masked a five fold variation between doctors of 5-27% (these observations allowing acceptance and quantification of the second hypothesis (page 106). When compared with other previously reported studies, this is a low rate of use of telephone advice - previous studies have reported telephone advice rates of 20% (7 doctors from 3 practices in Cambridgeshire) (Perry and Caine, 1990), 37% (5-57%) (77 doctors from 13 practices in North London) (McCarthy and Bollam, 1990), 57% (2 doctors, Teeside) (Marsh et al. 1987), and 74% (1 doctor, Kent) (Ridsdill Smith, 1983) suggesting the existence of a considerable range of behaviour amongst doctors. Such variation in the frequency of using telephone advice as the principal means of managing out-of-hours contacts begs questions regarding the quality of care being provided, and whether any of this variation can be explained. Consideration might be given to potential explanatory variables including the age, experience and qualifications of the doctor(s) involved. The particular on call arrangements might also be of relevance - in this study, based in an academic practice with lower than average commitment of individual practitioners to the out-of-hours rota I have described lower than average use of telephone management of contacts. One might suggest that doctors with a ‘generous’ on call arrangement might be more inclined to visit patients contacting out-of-hours. A study from Leicestershire (Crowe, Hurwood et al. 1976) reported a 35% use of telephone advice in managing out-of-hours contacts, and concluded that “a partnership

covering its own out-of-hours calls can provide a more personal service and appears to make fewer demands on NHS resources” (as measured by fewer acute referrals to hospital). This contrasts with the views expressed by Stevenson (1982) supporting the use of deputising services for out-of-hours work and suggesting that personal knowledge of the patient was not a major factor in determining the management of out-of-hours contacts. This present study has examined out-of-hours care provided by doctors from one practice to their own practice patients; deputies were not used for providing out-of-hours care. A recent study (McKinley, Cragg et al. 1996; Cragg, McKinley et al. 1996) from Manchester and Leicester compared the of out-of-hours care provided by general practitioners and deputising doctors. Follow up of 2,152 patients who requested out-of-hours care over a one year study period highlighted the higher use of telephone advice by patient's own general practitioners (20.2%) compared with deputies (0.72%), and the lower patient satisfaction following contact with the deputies compared with practice doctors - similar to the findings of a recent survey by the Consumer Association (Consumers' Association, 1998). In that work, striking differences existed between practice doctors, co-operative doctors, and deputising service doctors in the use of telephone advice and home visits with practice doctors visiting 62% of out-of-hours contacts compared with co-operative doctors who visited only around 10% of contacts. It is likely that a wide range of alternative variables should also be examined in regard to variations in the management of out-of-hours workload (Table 16). The study described here examines the effect of only two of the variables drawn from the list of potential variables which are recognised and presented in the Table. The underlying explanatory variables contributing to this effect are not clear, and their relative contributions need further exploration. As part of this process, this thesis examines the contribution of two key variables (the time at which an out-of-hours contact is made, and the availability of appointments) as set out in the hypotheses at the beginning of the chapter.

DOCTOR	PATIENT	OTHER
Perceived urgency	Action requested	Accessibility of other services (e.g. A&E)
Perceived necessity (Ridsdill Smith, 1983)	General pattern of use of services	Time of contact
Age, experience, education	Morbidity	Operation of practice appointments systems
Knowledge of patient (Stevenson, 1982)	Deprivation (Livingstone et al. 1989)	Nature of service in which doctor is operating (Consumers' Association, 1998)
"Attitude" (Cubitt and Tobias, 1983)	Age (McCarthy and Bollam, 1990)	

Table 16 Potential explanatory variables in frequency of use of telephone advice.

Whilst differences in the overall use of telephone advice may relate to a number of potential influences, the time of day at which the contact is made appears to exert an influence on the management of the contact. I have described three quite different patterns of response evident amongst the doctors contributing to this study depending on the time at which the contact was received. The study by Livingstone et al (1989) mentioned previously reported a low use of telephone advice overall (24%) but a substantially higher use of telephone advice for night-time contacts (41%) by the 8 doctors from two east London practices. Aggregated responses were broadly similar to that typified by Dr C in Figure 4. Other studies have examined this effect and Hobday (1993) records personal evidence of an overall 74% use of telephone advice for out-of-hours contact and a lower threshold of visiting night contacts (63 % telephone advice). Ridsdill-Smith (Kent) (1983) reports a personal use of telephone advice for 51% of daytime or evening contacts compared with 14% for night contacts. On this evidence, Hobday and Ridsdill-Smith may fall into the pattern of Dr B in Figure 4, Page 113, although with substantially different "real" rates in the use of the telephone out-of-hours. This study has addressed the specific issue of variation between general practitioners in the use of telephone

advice as the primary means of managing out-of-hours contacts. The time at which a contact is received has been identified as a factor which may have some bearing on the management decisions taken by doctors out-of-hours, thus providing a basis for accepting the third hypothesis proposed on page 106. Furthermore, individuals appear to be able to be grouped according to their response to the effect of time on their propensity to use telephone advice. A recent survey of 2,312 patients contacting out-of-hours services in London reported that half of the patients contacting the out-of-hours service wanted a visit; more than a third of patients given telephone advice had originally wanted a visit and were dissatisfied with the service provided (Salisbury, 1997b). A recent survey of nearly 3,500 people from the Midlands (Consumers' Association, 1998) reported that 60% of patients who had received telephone advice following an out-of-hours contact were very satisfied with the service they received, a higher proportion – 75% - were very satisfied if they had received a face to face contact with a doctor. Only half of the patients in the Midlands survey who had expected to receive a visit from the doctor actually received this management, and patients' levels of satisfaction with the out-of-hours care they received appeared to depend very much on how long they had to wait to see or speak to a doctor. Access to out-of-hours care, at least to the out-of-hours care desired by the patients in Salisbury's study, thus appeared to be compromised. Whilst the patients' expectations for care were not evaluated as part of this present study, the evidence provided suggests that at least for some doctors, time rather than medical need may be a determinant of whether a visit is provided.

6.4 Out-of-hours Workload and Daytime Workload

Two potential influences on daytime workload have been examined in this study. First, the association of variable daytime appointment availability was examined by investigating the likelihood of an out-of-hours contact occurring in an out-of-hours period following an afternoon where the availability of routine appointments at the start of the afternoon had been documented prospectively. A simple dichotomised variable was used to determine afternoon availability. A 2.5 fold increase in the likelihood of an out-of-hours contact was observed for days where the appointments system was fully booked at midday prior to the contact time. The influence of daytime doctor availability on out-of-hours workload has not been documented previously. It is of importance however to note that this study has only addressed the issue of out-of-hours contacts *with general practitioners*. Patients are known to use other services (principally those provided by A&E Departments) as an alternative to seeking the care of their general practitioner. To obtain a more complete picture, information on the utilisation of *all* out-of-hours services by patients would be required to be investigated. The role of the A&E Department in relation to the accessibility of general practitioner care forms the basis for a later study to be described in this thesis.

From evidence presented here it would appear that reduced daytime doctor availability may be associated with an increase in out-of-hours workload suggesting that the original and central hypothesis proposed in this study (page 105) can probably be accepted. This is a new finding, not previously reported in the literature. The strength of the association would require to be confirmed in a larger study examining out-of-hours workload in relation to appointment availability over a more prolonged period of time. Further investigation might also usefully be undertaken in relation to the effects of the association on general practitioners' perception of out-of-hours responsibilities – how many additional daytime appointments would be required to be provided to balance the 'risk' of an out-of-hours contact. This study only examined whether any out-of-hours contact took place – thus out-of-hours contacts occurring at 6.30 pm for example were given the same weighting as contacts taking place at 3am. Given that four out of every five urban and rural general practitioners in 1992 thought that they should be able to opt out of out-of-hours care arrangements, and that a similar number favoured the development of primary care emergency centres as an alternative to the prevailing out-of-hours arrangements (General Medical Services Committee of BMA, 1992) it seems unlikely that this weighting would be appropriate, at least from the perspective of the average general

practitioner. Further investigation would be required to determine the 'break point' at which the balance between daytime appointment provision and availability would be reasonably balanced against out-of-hour workload and commitment. Separate work would be required to ascertain the views of general practitioners and patients separately in this matter.

Second, the consulting pattern of patients presenting out-of-hours with a respiratory or ENT problem was examined with a view to determining whether prescribing an antibiotic in this situation influenced consulting behaviour (and hence workload, and appointment operation) in the seven days following the initial contact. Patients prescribed antibiotics had a lower reconsultation rate in the seven days following the initial contact than those who did not receive an antibiotic but the difference between the two groups was small. On the basis of these results, it would be reasonable to conclude that the likelihood of reconsultation in the seven days following an out-of-hours contact for a respiratory/ENT problem (unlike symptom relief and subsequent morbidity (Little, Williamson et al. 1997; Herz, 1988; Howie and Foggo, 1985; Taylor and Howie, 1983)) is reduced following the prescribing of an antibiotic at the initial consultation. On this basis, the fourth hypothesis (page 106) should be accepted, although with some reservation regarding the operational importance of the effect on appointment availability.

This study of general practitioners workload has highlighted considerable variation between general practitioners in the delivery of care following contacts received outside normal working hours. Three of the four proposed hypotheses should be accepted, although with some reservation regarding the importance of the size of some of the effects observed. The practice investigated had a moderately high level of out-of-hours demand, and there was an increased likelihood of an out-of-hours contact taking place during the evening or night following a day-time period when the practice had a fully booked appointment system. Discernible patterns and differences were evident amongst the trained doctors contributing to the study regarding the influence of the time at which the out-of-hours contact took place on the decision to visit or to the use of telephone advice as the primary means of managing an out-of-hours contact. Variations between the doctors contributing to the study were also observed in relation to the management of respiratory or ENT illness presented out-of-hours. A small but significant difference in re-consultation rates was observed between patients who either received, or who did not receive an antibiotic on account of such problems. Whilst patients receiving an antibiotic reconsulted less frequently than those who did not receive an

antibiotic, the difference was small, and it was judged that any secondary effect on subsequent workload (and therefore appointment operation) was only marginal.

Appointments systems are a commonly adopted strategy for many practices in managing the time available for interaction between patient and doctor. It would appear that a fully booked appointment system may have important sequelae for the doctor in the form of a risk of increased out-of-hours workload. The possibility that variations in the operation of appointment systems may also have potentially important sequelae for patients formed the basis of the next study.

Appointment Length and Patient Flow

1 Summary

- The consultation is a key element of general practice activity, and is known to be influenced by the contextual arrangements in which it takes place. Whilst an argument based on quality of care can be made for longer appointments, it is not clear how such a change might influence appointments system operation, or patient consultation and waiting times.
- A before and after observational study was undertaken in one practice to examine whether increasing average appointment interval was associated with any changes in clinical workload, appointments system operation, patient flow (the movement of patients through the surgery administrative systems), and consultation and doctor behaviour.
- Information was collected from the practice manual appointment record, information recorded regarding the timing of patient attendances, and information completed at the time of the consultation in the six weeks before and after increasing the appointment interval from 7.5 minutes to 10 minutes per appointment. Principal outcomes examined related to workload, appointments system operation, patient consultation and waiting times, and consultation and doctor behaviour.
- Information was available for 4,523 consultations with general practitioners over the 12-week study period. With the increase in appointment length, a smaller number of appointments were provided each week following the change in the system. A similar workload demand was observed in both periods, and consequently, a larger proportion of patients was seen as 'extras' under the new arrangements.
- The 2.5 minute increase in appointment interval was associated with a small increase in average consultation length and a reduction in the average waiting time in routine consulting sessions. In consulting sessions where a student was present, a similar increase in average consultation length was observed, but with an increase in average waiting time. The proportion of consultations lasting 10 minutes or more compared with the number lasting 5 minutes or less was unchanged in relation to the change in appointments system, but was observed to be greater in teaching sessions when an undergraduate student was present compared with non-teaching sessions.
- Patients seen towards the end of routine consulting sessions waited longer than did those seen earlier in the session. Following the change in the appointments system there was an equalisation of waiting time irrespective of the order in which the patient was seen at routine sessions, but an increase in waiting time for patients seen during teaching sessions.
- Planning the organisation of an appointments system requires several distinct decisions to be made. The preferred or actual average length of consultations has to be decided and booking arrangements designed to enable this to take place without doctors persistently running over time. The number of appointments per week required to meet anticipated demand has to be calculated on the basis of list size and expected annual consultation rate. However, an exact fit between supply

and demand will lead to congestion of the system, and it appears that flexibility in the form of over-provision of appointments to projected demand of about 120% should be built in. In the practice in which this study was carried out, 85 appointments per 1000 registered patients per week including 11 unbooked appointments per 100 registered patients on a Monday would enable consultation demands to be met without difficulty.

2 Background

A follow up study to the out-of-hours project was developed to examine issues relating to the provision and accessibility of primary care medical services. A health services research agenda¹⁰ seemed of particular relevance for a number of reasons. First, this was clearly an area of importance to patients as well as their doctors. Offering a service implies a means by which that service will actually be delivered - for my purposes, the appointments system was the setting in which the consultation would take place. Whilst the consultation might be subject to many influences, it is recognised that administrative factors (such as waiting time) occurring within and around the consultation may influence the content and dynamics of the interaction between doctor and patient (Heaney et al. 1991).

Second, whilst the previous work had begun to explore specific disease entities (respiratory and ENT disease presenting out-of-hours to general practitioners), the literature and clinical practice indicated the limitations of even the most rudimentary of diagnostic labels. Such morbidity as comes to the attention of the doctor is only a sample of all such morbidity which might have presented, and the labelling of a particular set of symptoms and clinical signs initially by the doctor concerned (for the purposes of medical research) and thereafter further interpreted by a researcher, involved a process which might be regarded as scientifically susceptible.

Third, research themes appeared to be of greater significance than disease entities. For example whilst the decision to prescribe or withhold antibiotics in out-of-hours patient contacts is of interest and importance, of equal importance is a consideration of how the constellation of symptoms associated with middle ear infection was understood and interpreted by the patient, and how that understanding was translated into demand for services and thus an influence on workload. In this respect the relationship between morbidity and workload is modulated by patient behaviour, and

¹⁰ Donabedian has observed that 'A health services *utilisation* research agenda is a framework to describe those factors that inhibit or facilitate entrance to the health care delivery system as well as measurements of .. entry .. and admittance.' (Donabedian, 1972; Donabedian, 1972).

by the ways by which patients may access services.

Reference has been made previously to the issue of quality in relation to delivery of services. The out-of-hours study had raised questions regarding the acceptability of inter-doctor variations in service delivery and it would be reasonable to consider whether quality could be defined in relation to the accessibility of medical services in general practice. With regard to the operation of appointments systems, two separate issues are of relevance: can quality standards be defined in relation to the operation of appointments systems, and how might such measures interact with operational factors such as waiting time and consultation length (reflecting patient "flow")? Previous work (Wilson, 1989; Morrell, Evans et al. 1986b; Wilson, 1985) including some carried out by colleagues (Heaney et al. 1991; Howie et al. 1989) had suggested that variations existed between doctors with regard to consulting style and patient flow patterns - to what extent were operational and flow variations associated with variations in clinical behaviours such as prescribing and referral or investigation patterns?

Whilst a literature exists regarding the evaluation of patient flow in practices, little has been reported in recent years regarding the operation of general practitioners' appointments systems. Surveys of general practice workload have been reported regularly, but results have generally not been contextualised - viewed as part of a dynamic equation defining the operational aspects of general practice service provision.

At the time this study was undertaken evidence was accumulating regarding the potential benefits to patient care of longer as compared with shorter consultations. Mismatch between preferred working rates and actual booking rates had been identified as a source of stress for general practitioners (Howie et al. 1992) and running late, the main consequence of this mismatch, was reported to be associated with a reduction in the quality of care delivered. Although the 10 minute appointment was considered by some (Wilson, 1989; Morrell et al. 1986b) to be a hallmark of quality of general practice care, the relationship between booking interval and consultation length had been only partially explored. From published

(Wilson, 1985) and anecdotal evidence it appeared that many doctors would like to operate a 10 minute appointments system, but feared the anticipated workload implications in changing from an appointments system with shorter booking intervals - summarised as 'increased overall consulting time and unchanged patient demand.' Some might imagine a 'workload dividend' obtained through thinking along the lines of '... If I deal with more of the problems at longer consultations there should be less subsequent demand for further consultations...' - a hypothetical relationship between quality of service delivery and demand for services (Gray, 1982) somewhat reminiscent of the 'health dividend' anticipated but never achieved at the inception of a nationalised system of health care in 1948. Certainly, the Swedish experience gives some credibility to the idea of a workload dividend. In that country (Andersson, 1995), average consultation length is in the order of 20 minutes compared with 7 minutes in the UK and annual consultation rates (ACR) have been reported to be approximately half of UK rates (Sweden ACR for women aged 35= 1.6 consultations per year ; equivalent UK figure ~4.3 (Cartwright and Anderson, 1981)). The fear of the unknown and negatively perceived consequences of increasing appointment booking interval does not, however, take account of the published work suggesting that longer booking intervals might be associated with a reduction in general practitioner stress (Howie et al. 1992), presumably also a desirable end in itself.

The decision by a medical centre to change from booking 8 patients per hour to booking 6 patients per hour provided an opportunity to examine some of the implications of such a change on clinical workload, appointments system operation, patient flow and consultation and doctor behaviour.

3 Research questions and hypotheses considered

As has already been stated (page 105), general practice appointments systems are viewed in this thesis 'not just as an organisational tool used for the administration of practice workload, but as a dynamic entity whose operation both influences and is subject to workload stresses placed upon it' – as such, appointments systems in general practice have a pivotal role in the accessibility of primary medical care. An observational study was designed following changes proposed to take place in the

author's practice (above). The research questions posed, and the hypothesis considered were as follows:

Is increasing the average appointment interval associated with any changes in respect of

- (a) clinical workload and appointments system operation
- (b) patient flow (the movement of patients through the surgery administrative systems) and
- (c) consultation and doctor behaviour?

These questions may be examined by addressing the following hypotheses:

'Increasing the average appointment interval in a pre-existing general practice appointment system will be associated with identifiable and measurable changes in clinical workload and appointments system operation'

• *Hypothesis 5*

'Increasing the average appointment interval in a pre-existing general practice appointment system will be associated with reduced patient waiting time and increased consultation length.'

• *Hypothesis 6*

'Increasing the average appointment interval in a pre-existing general practice appointment system will be associated with measurable changes in doctor's prescribing and referral behaviour.'

• *Hypothesis 7*

4 Method

4.1 Setting and Design

This study took place in one medical centre where a decision had been taken to make a significant change to the appointments system. The practice setting has already been described in some detail in the preceding study (page 106). An observational, before and after design was adopted, examining the 6 week periods immediately before and after the changes were introduced.

In the existing appointments system, surgery length was normally 105 minutes with 14 appointments available for each session (each appointment 7.5 minutes). Occasional double appointments were provided when a particular problem was anticipated (such as for an anticipated counselling session). Extra patients were accommodated during and after the existing appointments where necessary. A total of 35 surgery sessions were provided each week, with eight being scheduled for Mondays. In an emergency, an extra surgery would be provided if required but this was not needed during the six week period. When a student was present, patients were booked at 10-minute intervals and the same arrangements applied when a trainee was consulting.

After the change in appointments system, surgery length was increased to 120 minutes with 12 appointments available for each session (each appointment 10 minutes). Extra patients were limited to one at the end of the first hour and one at the end of the second hour of each session. Once again, an extra surgery would be provided if required, but this was not necessary during the six-week period. There was no change in the number of weekly surgery sessions arranged or in their distribution throughout the week. Consultations in which a student or trainee was involved continued to be booked at 10 minute intervals.

4.2 Principal measures, Instruments and Data Collection

Three sources of information (Table 17) were used to examine the four principal areas of interest (Table 18: clinical workload, appointments system operation, patient flow, or doctor consulting behaviour). These measures were examined principally in relation to the change implemented in the appointments system, but also in relation to whether or not the consultation was with a trainee general practitioner, or whether an undergraduate medical student was present during the consultation.

4.3 Clinical workload and appointments system operation

Information was extracted from the manual doctors appointment schedule operated in the practice reception area, and from the manual record of nurse consultations. At the end of the working day (around 1815 hours, after the practice was closed) the number of consultations in “non special clinics” during that day¹¹ was counted (blue or black entries in the appointment schedule), along with the numbers of extras (red entries), DNA’s (“#” against the patients name) and new home visit requests (from daily home visiting diary). At the same time (reflecting the baseline appointment schedule), the number of available (unbooked) appointments for the following day was counted and recorded. This information was extracted and recorded by reception staff who were fully briefed prior to the commencement of the study.

¹¹ ‘Special clinics’ included separate consulting sessions organised for child health clinics, maternity care, or chronic disease management

Reception		Consulting room
1	2	3
Appointment Attendance Record	Patient Label	Doctor Casesheet
(daily, 1815 hrs)	(per patient)	
Daily extract (1815 hrs) from appointment book	Completed for each patient attending	
Appointments offered		Header (per surgery)
Patient attendances		Doctor identifier
DNA's		Planned start time
Extras	Date*	Date*
New home visit requests		Body (per patient)
Unbooked appointments for following day	Initials*	Initials*
	Date of birth*	Date of birth*
	Appointment time	Nature consultation
	Arrival time	Start time of consultation
		End time of consultation
		Investigation undertaken
		Referral made
		Prescription issued

*Variables used for matching patient label with doctor casesheet entry

Table 17 Three data sources

Clinical Workload:	Number of patients seen, excluding special clinics (doctors and nurses recorded separately). New home visit requests.
Appointments system Operation:	Appointments offered each day. Patients failing to attend for previously booked appointments (DNA). Patients requiring to be fitted in as "extras" into clinical workload schedule. Appointments unbooked at the start of the working day.
Patient Flow:	Average waiting time. Average consultation length. Ratio of long to short consultations for each doctor (see text)
Consultation and Doctor behaviour:	Age and sex of patient. Prescribing behaviour. Referral/Investigation behaviour. Nature of consultation (new episode of illness or pre-existing problem)

Table 18 Principal measures examined during observational (before and after) study of changing appointment intervals from 7.5 to 10 minutes in one general practice.

4.4 Patient flow

Patient flow measures were examined through the use of synchronised stopwatches in reception and in each of the doctors consulting rooms. For each patient attending, a note was made on a patient label of the date of the consultation, along with the time of their arrival at the surgery, the time of their appointment (if pre-booked), their date of birth, and their initials. This record was retained, and later matched with the doctor's surgery casesheet. Each patient's waiting time and consultation length was calculated from the differences between their arrival time and the times of the start and end of the consultation. The percentage of consultations lasting 10 minutes or more divided by the percentage of consultations lasting 5 minutes or less (the "long to short consultation ratio" (Howie et al. 1991)) was calculated for each doctor and considered in relation to that doctor's prescribing pattern.

4.5 Consultation and doctor behaviour

The surgery casesheet, completed by the doctor during the consulting session recorded the doctor's name, the planned starting time of the surgery, the patient's initials and date of birth, the time of the start and end of the consultation, the nature of the consultation (whether for a new presentation or for review of a pre-existing problem), and whether a prescription was issued, referral made, or any investigation carried out. Observations were carried out from 6 weeks before the proposed change in the appointments system took place, to 6 weeks after the change had been introduced (February to May 1991).

4.6 Data preparation, processing and analysis

Data were visually scrutinised for legibility prior to professional data processing. Three separate sources of information were available: (i) the record of appointment operation and clinical workload (ii) the patient label completed at the time of patient's arrival at the surgery and (iii) the doctor's surgery casesheet. Data from (ii) and (iii) were electronically matched using a unique consultation identifier generated by computer using the date of the consultation and the patient's initials and date of birth. A record for each consultation was thus created comprising all of the patient flow, consultation and doctor behaviour for each consultation carried out during the study period.

Data were analysed using SPSS (SPSS Inc, 1990). Much of the data in this study is descriptive and is presented as such. Whilst consultation length was observed to be positively skewed, statistical advice suggested that the data should be considered as comprising a large random sample of independent observations of consultation length drawn from distinct populations. On this account t-tests were used to compare average measures of patient flow (consultation length and waiting time). Chi square tests were used to compare the proportions of long and short consultations and the measures of doctor behaviour (prescribing and investigation or referral) occurring in relation to the change in appointment system. I was responsible for overseeing data collection and processing, and personally responsible for data analysis and presentation.

5 Results

There were 4,523 consultations with general practitioners over the 12-week study period. Incomplete, illegible, or obviously inaccurate recording of information led to some variation in denominators used - consultation and waiting times could be calculated for 4,473 and 4,151 patients respectively. Other missing data were quantified and will be referred to below.

5.1 Clinical workload and appointments system operation

2,310 patients were seen in the six weeks prior to change and 2,213 in the six weeks after change (which included a holiday Monday when the surgery was closed). The nurse saw 672 and 678 patients in the two periods and the house call rate was 1.32/1000 patients per day before the change and 1.23/1000 patients per day after it. The number of consultations at teaching surgeries was 271 before the change and 305 afterwards; the trainee saw 396 and 296 patients respectively. The number of 'new' patient episodes was 1,075 and 1,027 in the two periods and the number of chronic/return consultations 1,048 and 1,103 (270 out of the total of 4,523 cases had information on type of consultation missing). In the new system the percentage of new consultations at teaching surgeries rose from 40% to 47% compared to a fall from 52% to 48% for routine surgeries. The number of patients failing to attend for booked appointments increased from an average of 31.9 per week before to 38.6 after the change.

5.2 Supply and demand; assessing 'fit' and 'flexibility'

The number of patients seen remained almost constant (2,310/2,213); however, the number of routine planned slots offered dropped by 13% from 2,899 to 2,532. Thus, overall the system apparently became more efficient by moving from an 80% 'fit' between appointments available and appointments utilised to a figure of 87%, part of this being explained by a week incorporating a holiday Monday. In practical terms, this was achieved at the expense of a loss of 'flexibility'. An average of 30 available slots at the start of each day before the change fell to an average of 17 afterwards, and the difference was greatest on a Monday (63 to 43). The effect was to put pressure from Monday onto Tuesday and in turn onto Wednesday with the result that although the Wednesday 'fit' changed from 79% to 96%, the flexibility necessary had been lost. The progressive increase in the number of 'extras' which had to be fitted

back into the system as the week progressed peaked on a Thursday when an average of 18 'extra' patients had to be fitted in after the change compared with 9 'extra' patients before the change. This extra load was passed on to the following week accounting for part of the loss of available slots at the start of the following Monday. These figures are shown in Table 19.

	Mean number of:							
	Patients seen		Appointments provided		Free appointments at start of day		Extra patients	
	Before change	After change	Before change	After change	Before change	After change	Before change	After change
Monday	95.5	81.0	115.2	105.6	63.0	43.8	16.3	13.0
Tuesday	77.2	82.8	98.0	92.0	35.2	19.8	12.5	12.2
Wednesday	70.3	75.7	87.2	78.0	18.0	3.8	12.7	17.3
Thursday	68.7	71.3	85.0	78.0	23.5	13.0	8.5	17.7
Friday	73.3	71.5	97.8	86.0	12.0	8.0	12.5	14.3
Total	385.0	382.3	483.2	439.6	151.7	88.4	62.5	74.5

Table 19 Clinical workload and appointments system operation data before and after changing the appointment length from 7.5 to 10.0 minutes

5.3 Patient flow

The change in booking system was associated with a number of changes in measures of patient flow (Table 20). An increase in the mean consultation length was seen following the introduction of the new consulting arrangements (from 8.6 ± 5.0 to 9.1 ± 5.5 minutes, $t = -2.6$, $p < 0.01$) for patients seen by experienced general practitioners in routine consulting sessions. The distribution of consultation length was observed to be positively skewed (Figure 7).

		Experienced			Trainee*		
		Median	Mean	N	Median	Mean	N
Consultation length							
Routine	Before	8.0	8.6	1667	8.0	8.6	373
	After	8.0	9.1	1613	7.5	8.5	284
Teaching	Before	10.0	10.9	244			
	After	10.0	11.0	292			
Waiting time							
Routine	Before	17.0	18.8	1535	12.0	15.9	333
	After	12.0	14.3	1513	14.0	15.9	268
Teaching	Before	16.0	18.8	224			
	After	20.0	21.0	278			

* not regularly involved in teaching

Table 20 Waiting time and consultation length (median, mean) in relation to changes in booking interval from 8 patients/hr (before) to 6 patients/hr (after)

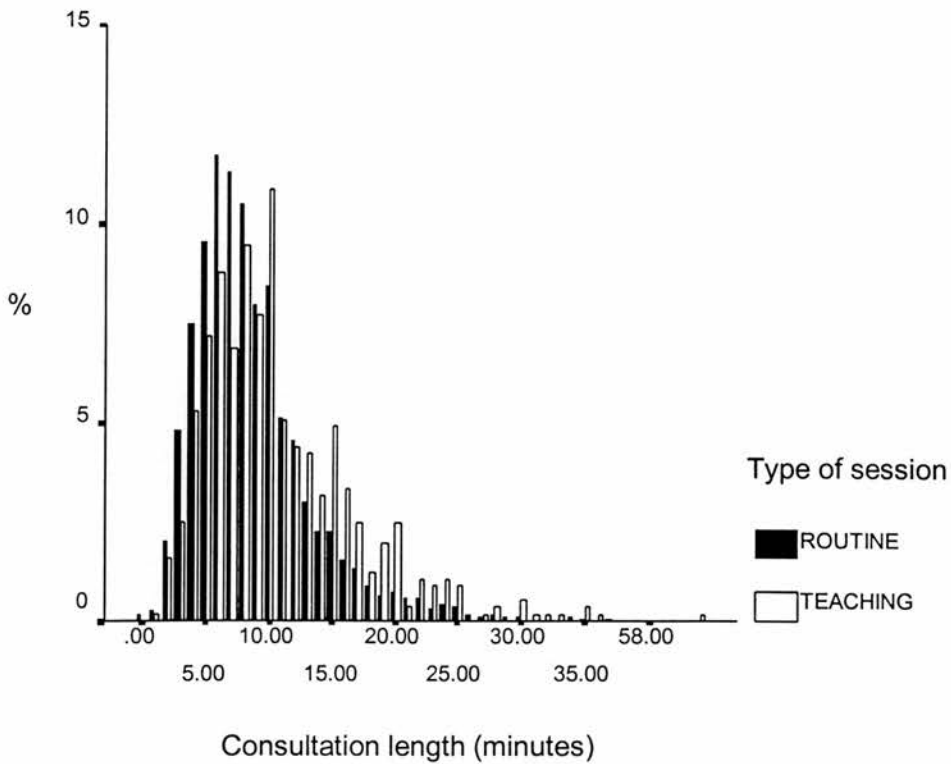


Figure 7 The distribution of consultation length (minutes) for 6 experienced doctors in routine or teaching sessions (n=3815 consultations)

During routine consulting sessions, mean waiting time fell from 18.8 ± 13.3 to 14.3 ± 11.9 minutes ($t\ 10.0, p < 0.000$). When an undergraduate student was present, consultation time remained constant in both phases of the study ($10.9 \pm 6.1, 11.0 \pm 6.8$ minutes, $t\ -0.2, p = 0.91$), but waiting time increased from 18.8 ± 14.7 to 21.0 ± 14.6 minutes ($t\ -1.7, p = 0.09$). The advantage in shorter waiting times was greatest for patients seen towards the end of routine consulting sessions where, at 12 minutes, it was 8.0 minutes less under the new arrangements compared to previously (Figure 8). Patients seen later in routine consulting sessions had median consultation lengths 1.0 minutes less than did those patients seen in the early part of the session in both phases of the study. Patients seen at the end of consulting sessions where an undergraduate student was present had an increase in their waiting time following the change in appointment arrangements compared with those seen earlier at such sessions (Figure 9).

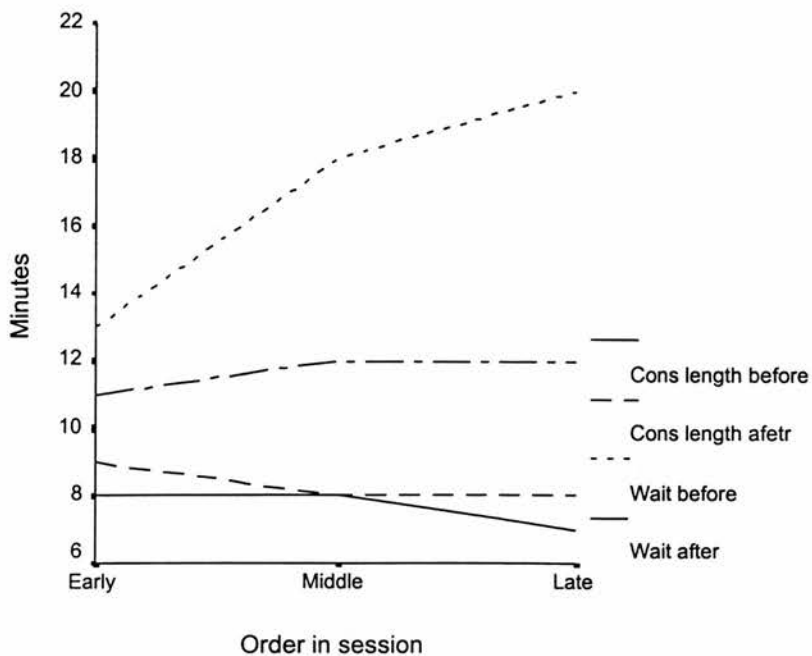


Figure 8 Median waiting and consultation time in relation to location in consulting session and change in appointments system (routine consulting sessions)

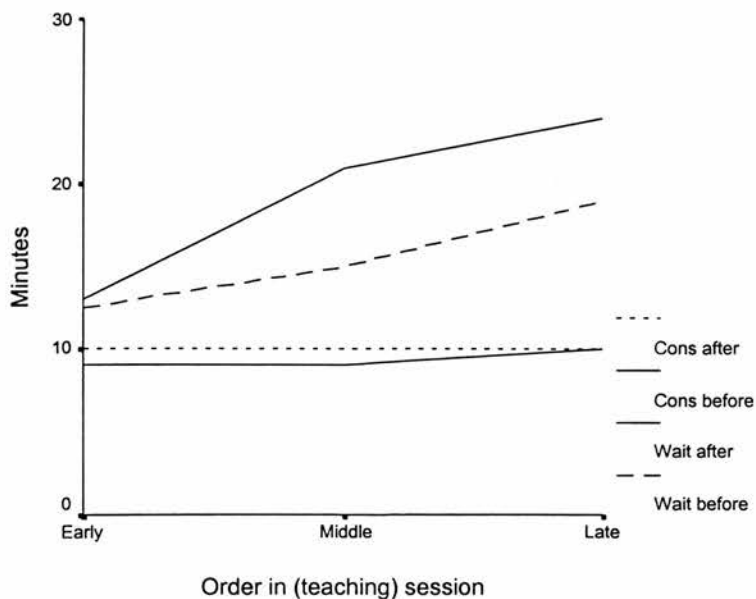


Figure 9 Median waiting and consultation time in relation to location in consulting session and change in appointments system (teaching sessions)

At routine sessions the proportion of acute problems fell from 52% to 48% of consultations, while for teaching sessions this proportion increased from 40.9% to 47.3% -broadly in line with the changes observed in waiting time. The proportion of return patients fell markedly at teaching sessions from 41.3% of consultations to 30.3% but remained nearly constant at routine sessions (29.0% / 30.7%). Median consultation length for consultations for new or chronic problems increased from 7.0 to 8.0 minutes, but remained constant for return consultations at 8.0 minutes.

A small increase in the proportion of consultations lasting 10 minutes or longer was observed following the change in the appointments system (34.2% before, 38.2% after, N=4535, df 2, chi square p=0.02), and this was matched by a slight reduction in the proportion of consultations lasting less than 6 minutes (24.4% before, 23.5% after, N=4535, df 2, chi square p=0.02). In view of the magnitude of these changes, it was judged that this effect was not likely to be of clinical significance. For this group of 7 general practitioners, the overall long:short consultation ratio was 1.7 (range 0.8-4.3). Of some interest however was the increase (range 57-782%) in long:short consultation ratio recorded for teaching surgeries compared with routine surgeries for 6¹² general practitioners involved in undergraduate teaching (Table 21).

¹² One experienced general practitioner was visiting the practice during the course of the study and was not involved in undergraduate teaching.

Doctor	Routine		Teaching		%increase in L:S
	N	L:S	N	L:S	
1	100	0.77	101	1.42	85
2	542	3.74	56	33.00	782
3	537	1.42	79	2.81	99
4	580	.67	65	5.83	771
5	549	1.19	95	1.87	57
6	730	3.04	139	6.00	97

Table 21 Change in long:short consultation ratio for 6 experienced doctors in teaching or routine consulting sessions and % increase teaching over routine

5.4 Consultation and doctor behaviour

The percentage of consultations at which a prescription was written remained constant (68%) in routine surgeries and rose from 58% to 64% (Chi squared 2.1, $p=0.15$) in teaching surgeries, roughly in line with the increase in the number of new patients seen. Doctors' prescribing behaviour did not appear to be influenced by the presence of an undergraduate student during the consulting session (correlation coefficient (Spearman rho) = 0.94 ($p<0.001$) when comparing the percentage of patients receiving prescriptions at routine with the percentage of patients receiving prescriptions at teaching surgeries for 6 doctors). There was evidence at both routine and teaching sessions of a positive association between the proportion of long consultations and prescribing (Spearman rho 0.75 and 0.71 respectively). Before the change in booking arrangements, 7.5% of routine consultations were followed by investigation or referral. This rose to 10.2% (Chi square 7.1, $p=0.008$) after the change; the figure in teaching surgeries was 10.4% and 15.5% before and after the change respectively.

5.5 Subjective reactions

Doctors and reception staff were initially apprehensive about making the change but when questioned none would have chosen to return to the previous arrangements. There were some difficulties fitting as many patients into 'same day' appointments,

but the lower waiting times once patients had arrived at the surgery appeared to have resulted in a reduced feeling of stress in the reception and waiting area (although levels of stress were not formally measured as part of this work).

6 Discussion

6.1 Study Design

As this study was carried out between February and May 1991, care should be taken before directly extrapolating the results to a different time of the year. In addition, the socio-economic mix of the patients registered with the practice, the practice's higher than average doctor to patient ratio, and the number of teaching surgeries carried out should also be taken into consideration. Furthermore, the changes observed in relation to workload and patient flow were observed over only a 12-week period – 6 weeks before and after the introduction of the change in appointment system. It would be of importance to ensure that the findings to be referred to were sustained in the longer term. Time did not permit a suitable follow up study to be undertaken (perhaps after a one or two year interval), and this must be judged to bring into question the wider applicability of the results obtained. A cautious interpretation of the findings would therefore be considered appropriate. Finally, the work was carried out in only one practice since the decision to undertake the study was taken at around the same time as the decision by the practice to introduce the administrative changes described. An alternative (and perhaps better) approach to examining the hypotheses presented in section 3, page 145 might have involved examination of the effect of introducing changes in practice appointments systems in a number of volunteer practices who might have been willing to undertake such an exercise, but this would have required a considerably larger study for which neither time nor resources were available. Such an approach would have permitted controlling for some of the effects of carrying out research in a practice known to be atypical in respect of staffing arrangements, teaching commitments, and (as I shall present) consultation arrangements. Such advantages should be offset against the disadvantages of increased difficulty in collecting data from numerous sites, with the predictable knock on effect that such data may well be of an overall poorer quality (Howie, 1979). In these circumstances, the former approach was adopted, and suitable caution should be undertaken in the interpretation of the results presented.

6.2 Clinical workload and appointments system operation

Whilst numerous previous studies have described and examined general practitioners' appointments systems, a search of the literature reveals very few studies that have documented the number of appointments that should be provided. It seems obvious that provision should relate to demand, but the precise relationship has not yet been determined. Does 'over-provision' of appointments result in increased consultation rates - a reflection of expressed demand, or (as previously suggested (Middleton, 1994)) is demand relatively constant for any given population under examination irrespective of the means by which that demand is met?

It is widely believed amongst the medical profession that the characteristics of the patient population are among the most important determinants of general practice workload - a higher proportion of children generating excess work through excess morbidity and increased demand for preventive health care by themselves, and also by their (young, female) mothers. Older patients are believed to generate additional demand on account of higher morbidity, and the received wisdom suggests that inner city practice with its attendant excess levels of deprivation is also associated with higher consultation rates. Certainly, it would appear that demand for general practice services (as expressed by consultation rates) varies widely amongst practices and geographical locations. Despite the broad acceptance of this wisdom, and its crystallisation into national policy through the use of Jarman, Townsend and Carstairs indices (Carstairs and Morris, 1989; Townsend, Simpson et al. 1985; Jarman, 1983) in determining allocation and distribution of resources, an extensive study from the North of England (Wilkin et al. 1987) was unable to confirm any association between consultation rates and a range of socio-demographic indicators considered individually (the proportion of children, younger women, elderly patients, or lower social class patients consulting). This information was derived after an examination of workload in relation to *practice* socio-demographic profile, and the authors recognised the inherent contradiction (Townsend et al. 1985) of these findings with their other observations based on *patient* interviews where women in all age categories examined reported higher consultation rates than men, older patients had higher consultation rates than younger patients, patients from deprived

areas reported higher consultation rates than those from affluent areas, as were rates for lower as compared to higher social classes!

The development of general practice has been associated with an increase in the use of appointments systems from 2% of practices in 1952 (Hadfield, 1953) to 70% in 1976 (Drury, Fry, J.1977) and 82% in a large survey of general practices in Manchester in 1987 (Catlett, Thompson et al. 1993). It has been recognised, however, that not all patients favour this trend, and Bevin and Draper (1967) and Taylor (1984) observed that the unemployed and patients from lower social classes were poor users of appointments. The move to appointments systems has not been universally acclaimed by general practitioners; in 1982 Noble described the re-introduction (after 15 years of a full appointments system) of a mixed scheduling system incorporating appointment as well as open access arrangements.

In this study, the change involved making a smaller number of longer appointments available. This resulted in fewer planned slots being left unfilled (an apparent increase in efficiency with a higher concordance between supply and demand). In addition, because of a closer fit, a loss of booking 'flexibility' resulted and more 'extras' had to be accommodated, especially later in the week. These changes have been investigated using a methodology which proved practical, at least over the 12-week period of the study. The changes proved to be identifiable, and measurable, and appeared to occur in temporal relation to the changes introduced in the administration of the appointment system. On this basis, the first hypothesis presented can be accepted, although with acknowledgement of the important provisos referred to in the preceding section.

It would appear that construction of an appointments system requires consideration of three elements: demand, efficiency and flexibility.

6.2.1 Demand

The amount of consultation time required in a practice is a product of the consultation rate per patient per year and the expected average length of each consultation. Whether the consultation rate should be 2.3 per patient per year

(Heaney et al. 1991) or 3.8 per patient per year (UK average) (Department of Health, UK Government Statistical Service 1996; Fry and Dillane, 1986) or over 4 per patient per year as found in Scotland is not clear but the evidence in favour of ten minute consultations is strong (Howie et al. 1992; Howie et al. 1991; Howie et al. 1989), and if longer is better (as suggested by Howie et al), then it would seem self evident that better care takes longer to provide.

Data presented here projects an annual surgery consultation rate of 3.6/patient/year for the 5600 patients on the practice list - reflecting a projected demand of 69 consultations per 1000 patients/week. This basic figure for demand takes no account of patients who fail to attend or who require longer appointments.

6.2.2 Efficiency

In the perfectly managed setting supply and demand should balance exactly. This of course is not possible and in the situation described here the change in weekly balance of 483 appointments offered to 387 patients seen (80% efficiency) to 440/382 (87%) efficiency was associated with increased numbers of patients requiring to be seen as 'extras'. An intermediate figure of about 475 appointments offered per week (85 per thousand patients per week) would have been optimal in this study- representing an 'efficiency' of 80% (475 appointments offered, 382 patients seen) and 'overprovision' of appointments to projected demand (69 per thousand patients per week) of 120%. Previous work (Fishbacher and Robertson, 1986) from a deprived area of Glasgow described the provision of 357 appointments each week for a practice population of 4300 patients (83 per 1000 patients per week). It is of interest that that work examining patients difficulties in obtaining appointments did not actually describe the planned appointment interval being used within the appointments system - an example of a rather narrow and specific approach adopted when considering only half of the equation referred to at (i) above.

6.2.3 Flexibility

Flexibility requires appropriate differences in allocation of appointments by weekday. Arber and Sawyer (1982) have distinguished between appointments systems in general practice and those in other walks of life on the basis that one

cannot plan in advance when illness will occur - flexibility is a necessary prerequisite in all general practice appointments systems. It is essential to provide sufficient vacant appointments to let expected demand be largely met on the day requested; essential because failure to do so is likely simply to result in a shift of workload to later in the week with predictable reduction in loss of appointment availability likened (Greig, 1984) to 'a ship at sea pushing ahead a bow wave of deferred work'. In the data reported the number of free appointments at the start of a Monday reduced from 63 to 43 with the observable result that a similar loss of vacant appointments did accumulate as the week progressed and the number of 'extras' having to be accommodated increased. The problem of accommodating such urgent consultations within an appointments system have been described from the perspective of both the practice (Field, 1987) and the patient (Rutledge, 1977). Field concluded that such appointment requests were largely inevitable, and on this basis, any reasonable system requires an inbuilt degree of flexibility. Fischbacher and Robertson (1986) described substantial loading of appointment slots around the weekend in one practice in the west of Scotland, with a doubling in the numbers of appointments offered on a Monday compared to a Tuesday. That degree of skewing was not observed in either phase of the study described here where the maximum range of daily provision of appointments varied between 85 and 115 appointments. Such skewing may simply relate to the incorporation of a half day during which the surgery was closed in the west of Scotland study - no such similar arrangements operated in the Edinburgh practice being studied!

The provision of appointment "slots" is not the only consideration, however, in construction of an appointments system. The overall quantity of consulting *time* provided is a further important consideration. Deciding the total quantity of consulting time required raises issues of both the effectiveness of consulting technique and the quality of care being delivered. Ensuring that booking patterns reflect realistic consulting speeds brings advantages to both doctors and patients in terms of improved patient flow; changing to an efficient 10 minute appointments system from an inefficient 7.5 minute system will not necessarily require much new working time.

6.3 Patient flow

Two principal patient flow measures were examined - consultation length and waiting time. Both (but especially consultation length) have been examined extensively in recent years. An early study from a medium sized Lancaster training practice (Worrall, 1981) using similar methodology to that adopted here, reported that 95% of patients arrived within five minutes of their appointment time, but observed that doctors who started a consulting session late fell further behind as the surgery progressed compared with their colleagues. Prior to the change in appointments system, waiting time for patients at routine and teaching sessions increased as the session progressed. The change in appointments system resulted in a reduction of patient waiting times for those patients seen at routine sessions and a levelling of waiting times throughout the session, but an increase in waiting time for patients seen during teaching sessions, especially for those in the middle and end of the session. A mathematical analysis of the relationship between appointment interval and waiting times for doctors and patients was carried out by Hill-Smith (1989) who noted the benefit to patients of short, frequent surgeries. In accord with these observations, Hill-Smith suggested that patients' waiting time decreased exponentially with increasing appointment intervals - very short appointment intervals being associated with no doctor waiting time but long patient waiting time, and the opposite also being true. Other contributory factors to patient waiting time will include the process by which patients are called to see the doctor, the distance and "transfer time" between consulting room and waiting area, and time given to non-consultation/ administrative procedures carried out between seeing patients. In this respect, patient non-attendance for pre-booked appointments may be seen as an advantage resulting in a (albeit unpredictable) gap in the appointments system, similar to scheduling catch up intervals within the system (as advocated by Hill-Smith, and Packham (1988) and adopted by Heath (1991)). Anecdotally, many practices accept at least some non-attenders for appointments - in the study described here the potential impact of an increase in the number of patients seen as extras was offset by a smaller, but still important rise in the number of non-attenders.

A study from an Edinburgh practice in 1977 (Rutledge, 1977) focused on patients' views on the practice's appointments system and suggested that the reported difficulties in patient waiting times (43% of the patient sample reported waiting time

in excess of 30 minutes) might be related to the overall underprovision of consulting time compared with demand. The present study was conducted in a practice where consultation length initially exceeded allotted time; a change was made (a smaller number of longer appointments) which allowed this imbalance to be reversed and also resulted in reduced patient waiting time. Given this, and the fact that the total number of patients seen remained about the same, the actual time spent consulting remained largely unchanged.

Unlike the results presented here, and the mathematical model (Hill-Smith, 1989) described above, Wilson (1989) reported a significant increase in patient waiting time after changing from a 7.5 to 10 minute appointment interval, which he partly attributed to late starting of consulting sessions. The overall dynamics of the appointments system (numbers of planned, extra, or non-attended consultations) was not described in detail and the change in booking was associated with a larger increase in consultation length, and so direct comparison with the results presented here is not possible.

A number of studies (Heaney et al. 1991; Ridsdale et al. 1989; Morrell et al. 1986b; Wilson, 1985; Anderson and Buxton, 1985) have highlighted the inverse relationship between consultation length and the number of patients seen in a consulting session. One of these however (Ridsdale et al. 1989), reported a wide variation in consultation length *irrespective* of the booking time in sessions where these booking times were non-systematically allocated on an experimental basis. A number of factors other than booking interval are associated with increased consultation length including doctor orientation to mental health issues (Whitehouse, 1987; Raynes, 1980), the doctors patient orientation (Howie et al. 1992), female doctor gender (Gray, 1982), smaller list size (Wilson, 1989; Howie et al. 1989; Butler and Calnan, 1987), consultation for previously unrecognised problems (Packham, 1988) patient psychological morbidity (Andersson et al. 1993; Packham, 1988; Westcott, 1977) and older patient age and higher social class (Buchan and Richardson, 1973). The observation that the median consultation length when an undergraduate student was present was 25% longer than when no student was present is of importance when considering the interaction between teaching and

service commitments. In the context of time management, teaching and service activities might thus be seen as presenting conflicting interests.

Following a feasibility study (Harrison, 1987), Harrison (1988) reported the successful introduction of a flexible appointments system where *patients* (unlike (Ridsdale et al. 1989; Roland, Bartholomew et al. 1986; Morrell et al. 1986b)) chose one of three booking times. Harrison's study was based in a semi-rural training practice in Nottinghamshire, and involved the examination of consultation requests by 339 consecutive patients. Consultation length increased with the booking time requested by the patient, and Harrison concluded that such a system encouraged patients to share in the responsibility of practice organisation. An alternative approach has been developed in Sweden (Andersson et al. 1995) where experienced primary care nurses are responsible for allocating appointment time, and do so based on the nature of the patients problem and in the light of their own experience. The authors suggested that this approach probably increased the quality of the general practice consultation.

Although it would have been of interest to investigate the changes taking place consequent on introducing an appointments system where patients rather than practice staff controlled the appointment interval, Harrison's work (Harrison, 1988; Harrison, 1987) (referred to above), did not present results in sufficient detail to allow for the calculation of the 'long:short' consultation ratio'. Furthermore, the sub-groups in Harrison's work were defined on the basis of appointment interval requested rather than on the basis of consultation length achieved, making direct comparison with Howie's work impossible.

The number of consultations lasting longer than ten minutes compared with the number lasting less than five minutes ("long:short consultation ratio") was proposed by Howie (Howie et al. 1991) as a possible proxy measure for quality in general practice, developing a suggestion made by Morrell and Roland (1987). Although questioned by some (Marriott, 1991), and welcomed by others (Heath, 1991) as a useful measure with practical applications in the setting of routine general practice care, the long:short consultation ratio has not been investigated in detail in any

substantial studies outwith Edinburgh.

In this study, long:short consultation (L:S) ratios were calculated for each of the doctors involved; for six experienced doctors, this measure averaged 1.7 over the 4500 recorded consultations. Howie's work examining 20,000 consultations by 85 Lothian doctors reported an average L:S ratio of 0.7, and on this basis it is concluded that the doctors in this practice (also located in Lothian) were not representative of their local colleagues in respect of the relative proportions of long and short consultations. A larger sample size of more representative doctors would be required before making a definitive statement regarding the effect on L:S ratio of the presence of an undergraduate student in the consulting room. Howie's work reported the findings obtained during the initial exploration of the L:S ratio in some detail, in order that readers 'could judge the balance between statistical and clinical importance in relation to the differences observed between groups in the L:S ratio'. With an average consultation length in routine consulting sessions of 8.6 minutes prior to the change in appointment interval, and 9.1 minutes afterwards, and an overall L:S consultation ratio of 1.7, the doctors contributing to this present study are more similar to the 'slower GPs' described by Howie et al who had an L:S ratio of 2.41 in consulting sessions where an appointment system was in operation (compared with the 'faster GPs' whose overall L:S ratio in a similar setting was 0.31). (The authors of the original work did not however quote the mean consultation length for the subgroups of doctors identified according to their consulting 'style', and this figure cannot be inferred from the other principal paper published relating to that work (Howie et al. 1989). Observation of Figure 1 in (Howie et al. 1991) again suggests that the present group of doctors are more similar in style to Howie's 'slower GPs' than to the group identified as 'faster GPs' in that study).

A small increase in the proportion of consultations lasting 10 minutes or longer was observed following the change in the appointments system, and this was matched by a slight reduction in the proportion of consultations lasting less than 6 minutes. Although statistically significant, the differences observed were small (+4.0%, -0.9% respectively), and taken by themselves should probably not dictate the planning of the appointments system for a whole practice. For the average general practitioner seeing 131 patients per week (Fry, 1993 Table 8.3, assuming 4 consultations per

week) such a change would equate to an additional 5 patients having consultations lasting longer than 10 minutes and 1 additional patient having a consultation length of less than 6 minutes each week. Although small, the changes observed, taken in conjunction with the other changes which appeared to accrue following the change in the appointments system (such as the reduction in average waiting length), tend to lend support to the idea that the changes introduced were of overall benefit to patient care. The increase in L:S ratio observed when doctors were involved in undergraduate teaching sessions compared with their behaviour in non-teaching sessions is a previously unreported indicator of the impact of undertaking undergraduate teaching in a service setting (Higgs and Jones, 1995). A substantial increase in the L:S ratio was observed for all experienced doctors, but the near eight-fold increase observed in two doctors is suggestive of important variations between doctors which would require exploration in a further study in which the personal characteristics of the doctors were documented and investigated in detail. It may be of importance that the greatest increase in L:S ratio was observed for the two doctors with the smallest number of teaching consultations. Much larger samples were available for non-teaching consultations, for most doctors considerably in excess of the sample sizes presented in Howie's original work (where an average of 252 consultations per participating doctor were recorded)(Howie, Porter et al. 1991). The possibility that the observed changes in L:S ratio are partly related to artefact based on small sample size should be considered in future developmental work examining the impact of teaching on appointment system operation and patient 'flow'.

6.4 Consultation and doctor behaviour

Whilst increasing the appointment interval would appear to have an advantage to patients through increased consultation length and reduced waiting time, there may also be an increase in the quality of consultations taking place in sessions where longer booking intervals have been used. Roland et al (1986) and Ridsdale et al (1989) observed that longer booking intervals were associated with the taking of more complete medical histories, more explanation for patients, and more discussion of health promotion issues. Similarly Howie et al (1991) reported an increase in dealing with psychosocial and long term health problems and in health promotion activities during longer consultations, and (importantly) observed that this change in behaviour

was independent of the natural "style" of the doctor whether as a naturally slow or a naturally fast consulter. Whilst Wilson (1989) reported a modest increase in screening activities and lifestyle issues during longer consultations, he observed no change in prescribing behaviour, doctor initiated investigations, or referrals during longer consultations. One author has argued that the proper place for longer consultations (especially those relating to health promotion) is outside of routine consulting sessions (Marriott, 1991). In the study reported here rather more patients had an investigation undertaken or a referral made after the change in the booking system and it is possible that this reflects a more comprehensive assessment of patients' problems. However, given that the length of consultations remained constant, it was not perhaps surprising that these effects were only of a small magnitude. Whilst Morrell et al (1986a) and Ridsdale et al (1989) had reported no increase in the frequency of physical examinations during longer consultations, Ridsdale noted the exception to this observation in increased occurrence of vaginal examinations during longer consultations, attributed by her to the length of time anticipated by doctors undertaking this examination.

Appointments systems are an integral part of current general medical practice and primary care. Although cited by patients as a source of dissatisfaction, this study has highlighted the balances and strategies that might be considered when planning and evaluating an appointments system. But what is the range of appointment provision between practices, and what implications follow on from different patterns of consulting arrangements? In particular, is there any basis in the charge levelled at general practice that fully booked appointments systems are a contributing factor to the 'primary care' element of workload encountered in hospital A&E Departments? And do patients who are dissatisfied with the arrangements for seeing their general practitioner, or who perceive their general practitioner as unavailable, use the services of Accident and Emergency as a proxy for the service they might otherwise have obtained through their general practitioner? Such questions formed the basis for the central studies of this thesis examining the relationship between the operation of general practitioner appointment systems in West Lothian, Scotland and the decision taken by West Lothian patients to self refer for care to the local A&E Department.

Chapter III

The West Lothian Studies

General Practice appointments systems, patient dissatisfaction and use of A&E

1 Summary

- Practices are known to vary in the consultation arrangements they provide for patients. Practices are also believed to vary in the use made of Accident and Emergency services by their patients. This study examines the relationship between (i) measures of how appointment systems work (ii) patients' dissatisfaction with and perceptions of the arrangements for seeing their general practitioner and (iii) practice self-referral rates to A&E Departments.
- Nineteen general practices in West Lothian, Scotland formed the setting for a prospective study employing analyses of computerised hospital records relating to attendances at the A&E Department of the local district general hospital over an eight week period by patients from the practice, of information obtained from patient surveys conducted in the A&E department (65% response rate) and in local practices (average 61% response rate), and of data collected by practices during an 8-week study period in 1993 regarding their workload and consultation arrangements. Principal outcome measures were: (i) measures of appointments system operation corrected for practice list size (ii) patient views on practice appointments systems (iii) self-referral rates by patients from practices under investigation to the local A&E department.
- Practices varied widely in respect of three measures of appointment operation: their rate of provision of appointments, in the proportion of appointments which were unbooked at the start of the working day and in the proportion of patients identified as "extras" by reception staff. The proportion of patients seen as extras was related to the proportion of patients reporting they normally waited in excess of fifteen minutes to be seen when attending their practice.
- Seventy percent of patients attending A&E during the study period self referred compared with 23% who were referred by their general practitioner. There was wide variation between practices in average practice self-referral rates, in general practitioner referral rates and in "other source" referral rates. The measures of appointment operation did not correlate with A&E self-referral rates by patients from practices under investigation. The straight-line distance between a practice and the hospital is confirmed as an important predictor of use of A&E services by patients who self refer to such departments.
- Patients attending A&E reported higher levels of dissatisfaction with the arrangements for seeing their general practitioner than did a sample of patients attending their general practitioner. This finding persisted after attempting to control for casemix, and was true whether patients were referred to A&E by their doctor or self-referred.

- When aggregated to practice level, a number of measures are identified as being associated with dissatisfaction with the arrangements for seeing a doctor. These include measures of appointment system operation, patients' perceptions of doctor availability, practice administrative and medical staffing, and practice list size.
- There is no evidence from this study that the variation amongst practices in A&E self-referral rates is related to the operation of general practitioner appointments systems. Distance between practice and hospital is confirmed as an important predictor of a practices patient self-referral rate to A&E.

2 Introduction

The previous ('flow') study examined the effects on appointments system operation, consultation length and waiting time, and consultation and doctor behaviour of a change in booking arrangements introduced in one general medical practice. A straightforward methodology was used to collect information regarding the provision of appointment, the numbers of patients seen, and the numbers of patients seen as 'extras' within the appointments system. Only one practice was examined however, and that practice was atypical in respect of the numbers of doctors available to see patients, the academic commitment of the doctors involved, and the consequent high ratio of doctors to patients. Patient flow measures had been used successfully, documenting patient waiting time and consultation lengths, but this methodology (involving the use of synchronised stop watches) might prove complicated to apply on a large scale, especially should there be a lack of skilled research staff to provide project support. Whilst general practice appointments systems are frequently highlighted as a focus for patient dissatisfaction in the UK (Consumers' Association, 1993; Consumers' Association, 1983; Cartwright and Anderson, 1981) and elsewhere (Gribben, 1993; Gogorcena, Castillo et al. 1992; Hall and Dornan, 1988), the previous study had only documented appointment operation from a provider's perspective; the opinions of patients of the changes which were implemented had not been sought or evaluated.

Most general practitioners now operate some form of appointments system, the operation of which have been the subject of audit (Fishbacher and Robertson, 1986) and assessment (Rutledge, 1977). Investigations have centred on the functioning of such systems in relation to patient satisfaction (Hall and Dornan, 1988; Allen et al. 1988), flow (consultation and waiting times (Campbell and Howie, 1992; Heaney et al. 1991; Ridsdale et al. 1989) and even anger (Anonymous 1992). An association of a fully booked appointments system with increased out-of-hours contacts the following night has been shown in one practice (Campbell, 1990).

Reference has already been made to the lack of published information on how many appointments should be provided, or when. Despite this, standards for dealing with urgent or non-urgent consultation requests have been proposed (NW Faculty of RCGP, 1986), and the problem of dealing with urgent demands (Virji, 1990; Field,

1987) or with non- attenders (Cosgrove, 1990; Bickler, 1985) within the context of appointments systems explored. The issue of general practitioner availability was raised in the 1990 general practice contract (Department of Health, 1990), where patient contact time was proposed as a measure of availability. Doctor:patient ratios have been suggested as an alternative measure of availability (Jones and McGowan, 1989).

The availability of the general practitioner is one potential influence on attendance at A&E Departments. It has been observed that a majority of A&E self-referrals take place when the surgery is likely to be closed (evening, night, or at the weekend) (Bowling, Isaacs et al. 1987), although Horder (1988) observed that 19% of patients using A&E services had no knowledge of their doctor's surgery hours, and a further 32% had no understanding of the emergency care provided by the practice. The Black Report (Black, 1980) suggested that A&E departments may be used in place of the general practitioner, and Foroughi and Chadwick (1993) have hypothesised that the number of "abusers" self referring to the A&E department was the same on Mondays as on Saturdays and Sundays because "GP surgeries are fully booked unless you care to make an appointment or wait." On the other hand, the Newcastle Accident Survey (Russell, 1977) refuted the idea proposed by the Expenditure Committee of the House of Commons (House of Commons, 1974) that "the use of appointments systems .. can be thought to have some influence on patients decisions to attend Accident and Emergency Departments."

In view of the above observations, a study was designed to examine some of these observations in more detail.

3 Research questions and hypotheses considered

The following questions are addressed in this study:

What is the variation amongst a group of geographically related practices with regard to:

(i) the operation of practice appointments systems?

'Arrangements for seeing a doctor and meeting workload demand will vary widely between a group of geographically related practices'

•Hypothesis 8

(ii) the use of A&E by their patients?

'Previous literature has suggested that there may be a relationship between the availability of appointments with general practitioners and the use of Accident and Emergency services by patients. Other authors have highlighted the association of proximity to an A&E Department with increased rates of utilisation of A&E services. It is therefore suggested that

'practices with low provision and availability of appointments will have a higher rate of Accident and Emergency attendance by their patients than practice having higher rates of appointment provision and availability',

•Hypothesis 9

'practices closer to an Accident and Emergency Department will have higher rates of Accident and Emergency utilisation than more distant practices.'

•Hypothesis 10

(iii) patient dissatisfaction with and perception of practice consulting arrangements?

'Patient dissatisfaction with and perception of practice consulting arrangements will vary widely between a group of geographically related practices'

•Hypothesis 11

What are the relationships between these three practice variables? Whilst previous authors have investigated the association of distance from Accident and Emergency on Accident and Emergency attendance rates, and others have suggested an association between Accident and Emergency attendance rates and general practitioner accessibility, no previous studies have examined these effects after

correcting for each other. It is suggested that

'distance from the Accident and Emergency Department is more significant than doctor availability when considering variations between practices in Accident and Emergency attendance rates.'

•Hypothesis 12

Furthermore, it is my suggestion that patients' perceptions of doctor availability are of greater importance in influencing Accident and Emergency attendance rates rather than measured doctor availability, and therefore that

'patients attending Accident and Emergency have a poorer perception of doctor availability than patients attending their general practitioner'

•Hypothesis 13

What factors predict patient dissatisfaction with general practitioner access arrangements? In line with Hypothesis 13, it is suggested that

'variation between practices in rates of patient dissatisfaction with access arrangements will be better explained by variations in patients' perceptions of doctor availability, rather than in measured appointment availability.'

•Hypothesis 14

In considering these research questions, and their associated hypotheses, it is important to note that the unit of investigation to be considered in all but one of these (Hypothesis 13) relates to practices, rather than to patients. Practice organisation tends to be peculiar to the practice rather than to individual general practitioners, and the hypotheses to be examined relate to differences between practices. In considering Hypothesis 13 the unit of investigation is a sample of patients attending either the A&E Department or a local general practice.

4 Method

4.1 The range of operation of appointments systems in West Lothian

All practices in the West Lothian district of Lothian Health Board were approached in November/December 1993 by initial letter and follow up phonecall from myself inviting them to contribute to the study. Those practices indicating any initial interest in involvement were visited. Doctors and practice administrative staff were invited to be represented at this initial visit where an outline of the proposed project was given. Practices were asked to comment on the proposed plan of investigation, and concerns were explored regarding potential workload following agreement to participate. To standardised initial information gathering, a short standardised interview regarding the practice was completed at this initial visit, usually with the help of the practice manager. This permitted an initial impression to be obtained of staffing arrangements, appointments system operation including normal booking interval for routine appointments, computerisation, fundholding status, premises etc.

Over an eight-week period from mid February to mid April 1993, participating practices recorded information about their appointments systems and workload on a daily basis. Information was collected at the start of the working day about the number of appointments being offered in routine consulting sessions, and the number still available (i.e. unbooked) at that time. At the end of the working day, information was collected regarding the number of patients seen that day at routine consulting sessions and at special clinics (e.g. antenatal clinics, health promotion clinics) and the numbers of patients consulting who were considered "extras" was noted. An 'extra' was defined at the start of the study as a patient seen at a consulting session who was considered additional to the number of patients normally seen or anticipated at that consulting session. Three measures of appointment operation were thus available for analysis: the number of appointments offered, the number of appointments available, and the number of patients seen as 'extras' (all corrected for list size). Practices were categorised as having "low", "medium" or "high" ranking for their provision of appointments, number of free appointments at the start of the working day, and for their number of patients seen per day. Although information on appointment provision and availability was collected for individual doctors, statistical advice suggested the aggregation of this information to a practice level for

the purposes of analysis. As a measure of local deprivation, a Carstairs deprivation score (Carstairs and Morris, 1991) was allocated to practices using the appropriate postcode sector (e.g. EH31 7) from the practice address.

4.2 The use of A&E by patients from practices in West Lothian

Only two of the practices routinely recorded A&E attendance by their patients, but none systematically recorded the source of referral of the patient to A&E. An initial investigation suggested that the majority (at least 80%) of patients in West Lothian using A&E attend one local A&E department situated centrally at St Johns Hospital, Livingston.

Data were extracted from the computerised record of patients attending the A&E department at St Johns Hospital, Livingston New Town regarding the demographic features of patients using the service, their postcode, registered general practitioner, and source of referral to A&E. This information was extracted from the A&E department HOMER database, used for recording all attendances at A&E at St John's Hospital. Data were supplied on floppy disk by hospital information technology staff. Rates of use of A&E were calculated for each practice with respect to patient self-referral rates, general practitioner referral rates, and 'other source' referral rates (including for example referrals to A&E by the police or social workers). These rates were expressed as a rate per 1,000 registered patients on the practice list measured over the 8-week study period.

To calculate distances between West Lothian practices and A&E, postcode information from each of the practices and from St Johns Hospital was processed in the POSTZON program made available by the University of Edinburgh Data Library. This software allocates ordinance survey grid references to each UK postcode using the centroid of the area covered by the postcode as the reference point. Accuracy is believed to be within 10 metres (Personal Communication Dr Donald Morse, Edinburgh University Data Library 1992). Straight-line distances between the practice and A&E were calculated using Pythagoras' theorem.

4.3 Patient dissatisfaction with and perception of the arrangements for seeing a doctor in their practice

During one week of the eight-week study period, patients attending participating practices, or A&E were invited to complete a questionnaire (Appendix A,B) which included questions about the areas mentioned above. The information requested is summarised in Table 22 .

Patients' perception of, and satisfaction with, the arrangements for seeing their general practitioner was recorded using a five point scale (very satisfied, satisfied, 50-50, dissatisfied, very dissatisfied). Responses on the lower three points were taken to indicate dissatisfaction. Patients also reported how soon they thought they could be seen by "a doctor from their practice" following an urgent or non-urgent appointment request (asked separately). Responses were obtained using a five-point scale (same day, day after, 2-7 days later, more than 7 days later, don't know). A target availability of patients being seen the same day for urgent problems, and within two days for non-urgent problems was adopted. The percentage of the questionnaire respondents reporting that their practice achieved these targets was determined for each practice. The percentage of patients reporting that they "normally wait more than 15 minutes to see their doctor" was also calculated for each practice - this being derived from patients' responses to a six point waiting time scale (0-5, 5-15,15-30,30-45, >45 minutes, don't know). Information obtained from patients was aggregated to practice level, with 'don't know' responses being excluded from the analysis. Patients attending A&E who did not complete a questionnaire at the time were sent a second questionnaire approximately 3 weeks later. The views of patients attending A&E or the general practitioner with problems they described as "accidents" were analysed separately thus controlling for casemix.

Information	Notes
From all patients	
Personal information	Age; sex; marital status; car and home ownership; employment status
Current attendance	Date, time
Current problem	Length of history; possibility for telephone management by GP; nature of problem
Accessibility of surgery premises	Distance between home and premises; travel time between home and premises; means of transport used on this occasion; where travelled from
Patient perception of: medical urgency	
own practice's appointments system/ consulting arrangements	Doctor availability to deal with urgent or non-urgent problems; overall dissatisfaction with consulting arrangements, anticipated waiting time; acceptability of waiting time
role and accessibility of GP and A&E	
their previous use of emergency services	
their management of strained ankle in context of full appointments system	
potential improvements in their practices consulting arrangements	
From patients attending GP only	
Current attendance	Which professional/type of clinic
Present consulting arrangements	Was consultation by a planned appointment
From patients attending A&E only:	
Understanding GP consulting arrangements	i.e. presence of appointments system
Source of referral	Whether sent by doctor or nurse
Anticipated delay in seeing own doctor with	
Accessibility of A&E	Distance; travel time; where travelled from.

Table 22 Information obtained from patients at questionnaire survey

In order to help clarify whether the sample of respondents was representative of the local population, information obtained regarding car and home ownership and employment status was compared with equivalent data from the 1991 census for the

20 postcode sectors of West Lothian. The proportions of under 5s and over 65s in the questionnaire survey were compared to the proportions in the combined practice lists for the 18 practices contributing to the questionnaire survey.

4.4 Medical Urgency score

A score for medical urgency was calculated for each respondent on the basis of their summed responses of perceived urgency using 10 case vignettes. Respondents were asked 'how soon the following patients should be able to see their family doctor' and responses were obtained using a 5 point scale (immediately (scoring 1), same day, within 2 days, within 7 days, no need to see doctor (scoring 5)) to such items as "a 40 year old labourer with an itchy rash on the hands" or "chest pains in a 45 year old man". Summed scores were corrected for the number of valid responses, then extrapolated to the maximum potential score of 50. Further investigation of perceived medical urgency is reported in a later investigation.

4.5 Analysis

Data was collated on a main frame computer and analysed using SPSS (SPSS Inc, 1990). In comparing differences between practices, combined data were aggregated to practice level, and simple associations between variables aggregated to this level were tested by Spearman rank correlation. Multiple linear regression with stepwise elimination of non-contributing variables was used to test associations between dissatisfaction or A&E attendance and possible predictors of these variables aggregated to practice level. Groups of individual respondents were compared by chi-squared or Mann-Whitney tests. One sample t tests were used to compare questionnaire respondents with published data extracted from the 1991 census.

The West Lothian Studies involved the collection of three different datasets: (i) a survey based on individual patient responses, (ii) a survey of practice appointments systems based on individual practices and (iii) A&E attendance data relating to practices. Accordingly, the combined dataset was analysed at practice level. As conclusions drawn regarding patient satisfaction with general practitioner accessibility were open to the ecological fallacy in which "properties found to be correlated at the higher level are assumed to be correlated at a lower level of

analysis" (Galtung, 1967 p 44-45), a subsidiary analysis was carried out on individual patient data to examine the hypothesis that satisfaction with general practitioner accessibility was linked to A&E attendance.

Ethical approval for the study was obtained from Lothian Health Board.

5 Results

Nineteen of the 26 practices in West Lothian agreed to collect daily information regarding their appointments systems. Eighteen of the 19 were prepared to distribute questionnaires to patients in the practice. The mean list size for participating practices was 6786 ± 3487 (N=19) and for non-participating practices 5452 ± 3353 (N=7). For this average list, participating practices attracted deprivation payments for 23 (high level), 154 (medium), and 280 (low) patients, and included 523 under 5's, 459 patients aged 65-75, and 295 patients aged 75 or older. The combined list size of the participating practices was 128915 patients and of non-participating practices was 38169 patients. Practices were categorised as small (<6000 patients, n=9), medium (6001-10000 patients, n=4) or large (more than 10000 patients, n=5). Ten of the practices were involved in general practitioner training. At the time of the study, 3 of the practices were fundholders, 7 were considering fundholding, and 7 were not interested in fundholding.

Throughout the eight week study period, participating practices saw 67756 patients in routine, and 6002 patients in special clinic consulting sessions which represented 72 consultations per 1000 registered patients per week. In the one-week questionnaire survey in 18 practices, 5310 questionnaires were completed, representing an average distribution rate of 66 ± 21 % of total consultations during that week¹³. Respondents were not significantly different from the general population of West Lothian with regard to car and home ownership (68% v 63 % car ownership, $t=-0.29$, $p=0.78$; 47% v 46% local authority accommodation, $t=0.04$, $p=0.97$) and the combined age profile of participating practices (4.7% v 5.8% aged <5 years; 6.9% v

¹³ Five thousand and ninety-four (5,094) completed questionnaires were obtained from practices operating an appointments system.

8.5% aged >65 yrs). There was a significant difference between practices in the mean age of respondent (36.7 ± 18.7 years (sd), range 34.0-42.6 years for 18 practices, $F=3.8$, $p<0.0001$).

Sixty five percent (456/699) of new patients attending A&E completed questionnaires, of whom 375 were registered with a general practitioner in West Lothian. Forty-eight of the respondents were registered with a general practitioner outside of West Lothian, and 33 respondents did not identify their general practitioner. Two hundred and thirty three of the 456 questionnaires were completed at the time of attendance at A&E, and 223 after sending questionnaires to initial non-respondents. Respondents who completed a questionnaire at the time of A&E attendance were similar with respect to age, sex, marital status, employment status and car ownership to those who completed a questionnaire following a reminder. They differed however with respect to the patient's referral route (25% v 45% referred by a doctor or nurse, $p<0.0001$) and their follow up at A&E (63% v 42% being discharged to the care of their general practitioner, $p<0.0001$; 4% v 17% requiring admission to hospital, $p<0.0001$). Patients who completed a questionnaire were similar to non-respondents with respect to age, sex, and the proportion discharged to the care of the general practitioner following their attendance. A slightly lower proportion of respondents had self-referred to A&E (68.3%) compared with non-respondents (70.5%).

5.1 The range of operation of appointments systems in West Lothian

All but one of the 19 participating practices operated an appointments system. Practices reported that an average of 87% (range 70%-100%) of patients consulting were seen within the appointments system. The average reported booking rate for practices using appointments systems was 8 patients booked per hour, equivalent to 7.5 minutes per patient. The rate of provision of routine appointments (ie not special clinics) and the rate at which patients were seen is shown for individual practices in Figure 10 which portrays an average of 63(45 - 86) appointments offered per 1000 registered patients per week in routine consulting sessions compared with a routine

workload of 66 (52-94) patients seen per 1000 registered patients per week. Twelve of the 18 practices offered fewer appointments than the average weekly workload, and so were presumably meeting the routine consultation demand with alternative arrangements. The ratio of numbers of patients seen in routine consulting sessions as a percentage of the number of appointments offered in such sessions (referred to previously as the 'efficiency' of the appointments system, page 162) averaged 96% (range 61 -124%). Reception staff from practices operating an appointments system reported an average of 10 (2-22) 'extras' per 1000 registered patients per week, and there was a significant positive association between the efficiency of the appointment system and the numbers of 'extra' patients seen during routine consulting sessions (Figure 11, Spearman rho 0.79, $p < 0.001$). There was a suggestion of a rather weaker association between the proportion of patients seen as extras and the proportion of patients reporting they normally waited in excess of 15 minutes to be seen when attending their practice (Spearman rho 0.44, $p < 0.07$). There was a positive association between the proportion of patients reporting that their practice achieved the availability target for non-urgent appointments and both the availability of unbooked appointments and the rate of appointment provision (Table 26, page 191 and Table 27, page 192). A negative association existed between the proportion of patients identified as 'extras' by reception staff and reported doctor availability in the non-urgent situation.

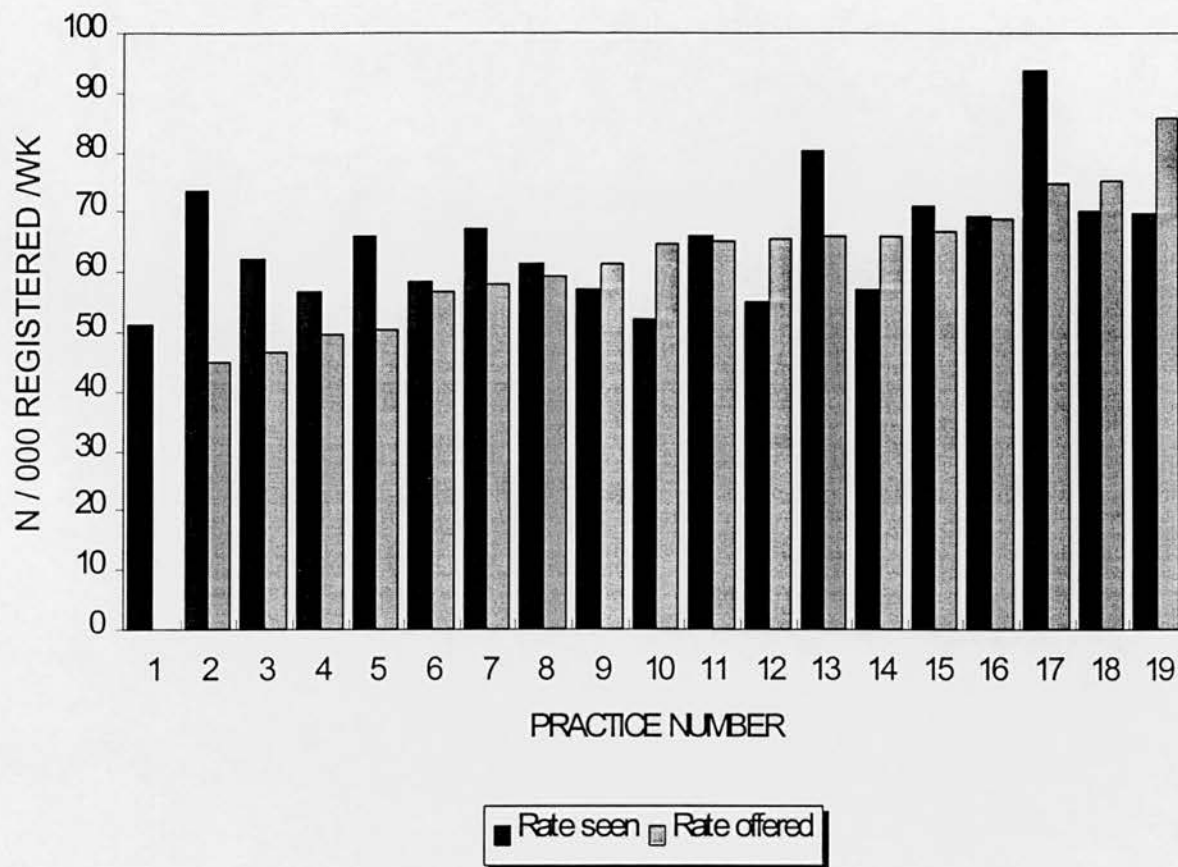


Figure 10 Comparison of rates at which patients were seen in routine consulting sessions with rate of appointment provision in such sessions (19 West Lothian practices, one of whom (practice 1) does not operate an appointments system). Average weekly rates per thousand registered patients over 8 week study period.

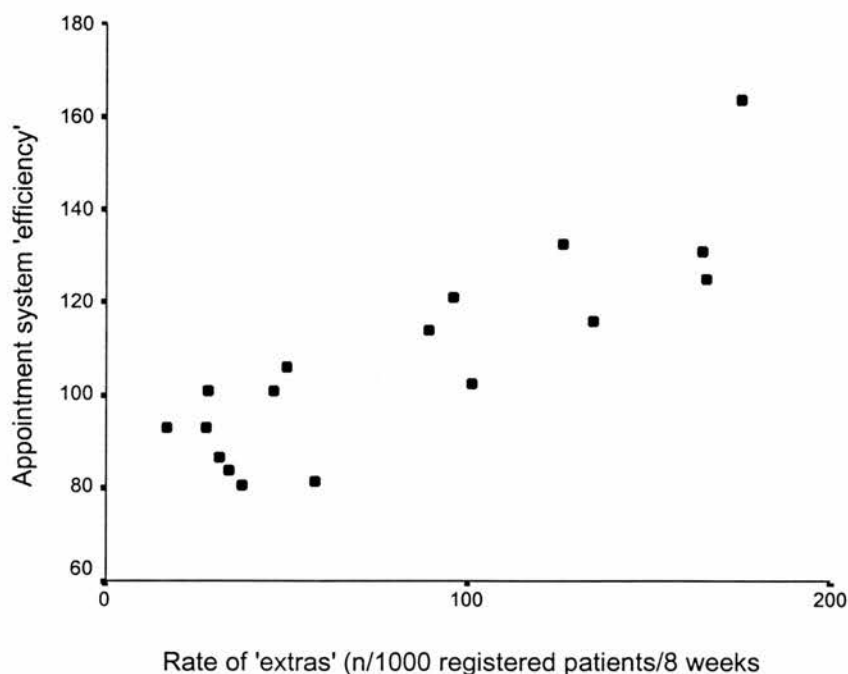


Figure 11 'Efficiency' of appointments system - the ratio of numbers of patients seen as a percentage of the numbers of appointments offered in routine consulting sessions in relation to the numbers of patients seen as 'extras'. Data based on 17 practices operating an appointments system.

There was no difference between training and non-training practices or fundholding/non-fundholding practices with respect to any of the measures of appointment operation or workload. No correlation was observed between practices' Carstairs deprivation index and practice workload as measured by the numbers of patients seen at routine consulting sessions or overall workload at all types of consulting session. Similarly, there was no relation between routine or overall workload and the percentage of under 5s or over 65s on the practice list, or the proportion of a practices questionnaire respondents who were unemployed or living in local authority accommodation or who did not have access to a family car.

5.2 The use of A&E by patients from practices in West Lothian

Patients registered with general practitioners in West Lothian generated 4849 of the 5684 recorded A&E attendances at St John's Hospital during the eight week study period - of these, 3369 (70%) were self-referrals, and 1130 (23%) were referred by their general practitioner. The remainder (350, 7%) were referred from other sources - police, school, work etc. There was wide variation between practices in practice self-referral rates corrected for list size, in general practitioner referral rates and in "other source" referral rates (Table 23). In contrast with questionnaire respondents attending general practice (where 37% walked to the practice and 55% used private (non public) transport such as a car), 91% of A&E respondents had travelled by private transport, and only 3% had walked to the hospital (chi squared for differences 216, $p < 0.0001$).

	SELF	GP	'OTHER'
Rate*	20.6 ± 6.7	7.0 ± 2.3	2.3 ± 1.4
Range	4.6-33.2	1.9-12.2	0.2-6.3

* "Rate" refers to the numbers of patients attending the A&E Department per 1,000 registered patients in the individual practice over the eight week study period. Rates quoted here are further subdivided by source of referral - either self, general practitioner or "other."

Table 23 A&E attendance rates(sd) for 26 practices over eight week study period by source of referral (self, general practitioner, or other source).

Information on A&E self-referral rate, distance between practice and A&E, list size, and a measure of local deprivation were available for all 26 practices in West Lothian. Investigation of these variables using Spearman correlation identified that A&E self-referral rates by patients from these practices was correlated with the distance between the practice and A&E ($\rho = -0.64$, $p < 0.01$) and local deprivation ($\rho = 0.54$, $p < 0.01$). Regression modelling with stepwise elimination of non-contributing variables however confirmed both of these variables as independent predictors of practice A&E self-referral rate (Table 24). Distance between practice and A&E explained 24% of the variation between practices in patient self-referral

rates (geographically closer practices having a higher rate of self-referral than more distant practices), whilst the inclusion of Carstairs deprivation score explained a further 20% of the variation between practices (practices from more deprived neighbourhoods having a higher rate of self-referral than those from more affluent neighbourhoods).

	B*	T	sig T	R²
Practice A&E self-referral rate				
Distance between practice and A&E	-1.1	-5.6	<0.01	0.24
Carstairs deprivation score for practice	1.5	4.3	<0.01	0.25
Combined R²				0.44

**B is the regression co-efficient*

Table 24 Regression modelling of practice A&E self-referral rates for 26 West Lothian practices

For the practices contributing to the study, a wider range of information was available, and the relationship between A&E self-referral rates by patients from practices and a number of other practice based variables was investigated using Spearman correlation. The following practice measures had no significant correlation with A&E use (see Table 26, page 191 and Table 27, page 192): practice appointment operation (rate of appointments offered or available, or the numbers of patients seen as 'extras'), routine practice workload, or practice list size. Additional measures which had no significant correlation with A&E use included:

- the proportion of patients normally anticipating a waiting time in excess of 15 minutes when attending the practice,
- the proportion of patients reporting that their practice achieved the pre-defined targets for availability following either an urgent or a non-urgent consultation request (described more fully in a later section), and
- the Carstairs score of local deprivation.

Distance between the practice and A&E was confirmed as the only independent predictor of practice A&E self-referral rates (Spearman rho -0.68, $p < 0.002$, R^2 0.42). There was no association between general practitioner initiated referral rates to A&E and the distance of the practice from the hospital. The situation with regard to the influence of deprivation was particularly confusing since for the smaller number of practices contributing to the study, there was no evidence of an association of deprivation with practice A&E self-referral rates, despite the evidence presented in Table 24 and referred to previously.

5.3 Patient dissatisfaction with and perception of the arrangements for seeing a doctor in their practice

Twenty five percent (1254 out of 5100 valid responses) of West Lothian patients attending their general practitioner and 36% (132 out of 371 valid responses) of West Lothian patients attending A&E were dissatisfied with the arrangements for seeing their general practitioner (Table 25, Mann Whitney U test comparing patients attending A&E with those attending general practitioner, $U=889564$, $z = -6.1$, $p < 0.001$). The proportion of dissatisfied patients varied widely amongst participating practices (Figure 12). There was no significant correlation between the average age of respondents in the practice and the proportion of respondents less than satisfied with the practice's consulting arrangements. For those patients attending A&E dissatisfaction with the arrangements for seeing their general practitioner was independent of whether they were self referred or not (Mann Whitney U test comparing patients referred to A&E by a doctor or nurse with those who self referred, $u=21411$, $z = -0.29$, $p=0.77$). The relationship between three measures of appointments system operation, workload, practice list size and patient dissatisfaction with the arrangements for seeing a doctor are described in Table 26, and Table 27 which also document the relationship between these measures and (i) the percentage of respondents reporting their practice meets the predefined availability targets following an urgent or a non-urgent appointment request and (ii) practice A&E self-referral rates.

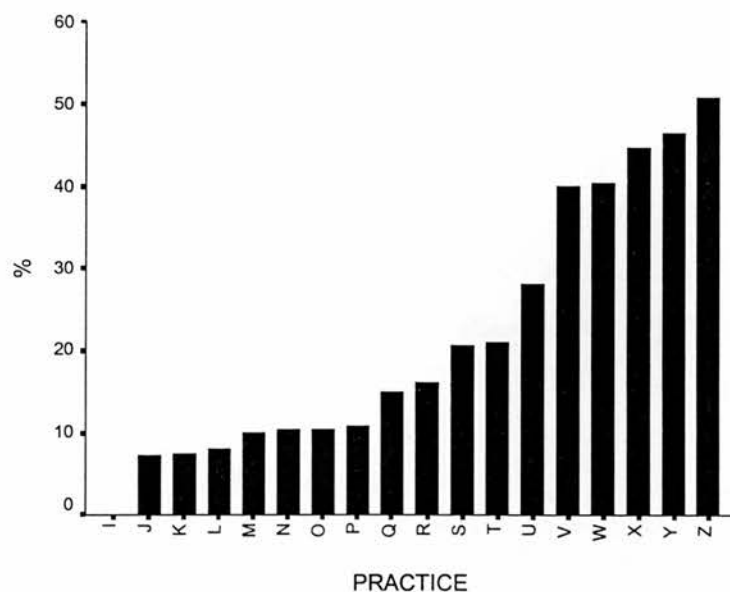


Figure 12 Percentage of patients less than 'satisfied' (see text) with the arrangements for seeing a doctor in their practice. Data obtained from 1-week survey in each of 18 practices.

	Patients attending general practice	Patients attending Accident and Emergency	
		Referred by doctor/nurse	Not referred by doctor / nurse
Very satisfied	1997 (38%)	43 (31%)	57 (25%)
Satisfied	1849 (35%)	48 (34%)	89 (39%)
50-50	972 (18%)	37 (26%)	64 (28%)
Dissatisfied	228 (4%)	9 (6%)	14 (6%)
Very dissatisfied	54 (1%)	3 (2%)	4 (2%)
Missing response	210 (4%)	1 (1%)	3 (2%)
Total	5310 (100%)	141 (100%)	231 (100%)

Table 25 Patient reported dissatisfaction with their practice's arrangements for seeing the doctor. Responses obtained from 5310 patients from 18 participating (West Lothian) general practices compared with the responses from 375 West Lothian patients attending the local A&E, 141 of whom were referred by a doctor or nurse, 231 of whom were not referred by a doctor or nurse, and 3 of whom did not record source of referral (not included in Table).

		% Respondents less than 'satisfied' with access arrangements	% Respondents reporting practice attains target for non - urgent availability	% Respondents reporting practice attains target for urgent availability	A&E self-referral rates ^e	Number of practices ^f
Start of day availability ^a	Low (<35)	32.3 (13.1)	29.9 (12.1)	76.7 (9.4)	20.1 (1.0)	5
	Med (35-150)	21.2 (15.4)	67.5 (23.7)	80.1 (8.5)	21.4 (0.1)	7
	High (>150)	14.2 (17.6)	74.0 (31.3)	85.1 (8.5)	21.8 (9.9)	5
Appointment provision ^b	Low (<470)	33.2 (13.9)	27.7 (13.2)	77.4 (8.7)	20.8 (1.9)	5
	Med (470 - 530)	20.3 (16.1)	70.1 (25.5)	80.1 (8.5)	21.2 (4.7)	7
	High (>530)	15.7 (15.4)	72.6 (24.9)	84.4 (9.9)	20.4 (9.7)	5
Extras ^c	Low (<35)	15.3 (13.9)	79.4 (17.3)	81.7 (10.9)	20.6 (10.0)	5
	Med (35-100)	12.1 (7.1)	72.3 (22.3)	85.6 (4.4)	22.3 (3.6)	6
	High (>100)	38.7 (11.6)	76.9 (12.1)	74.6 (7.8)	19.6 (2.9)	6
Practice list size	Small (<6,000)	14.5 (11.9)	69.0 (28.4)	86.7 (8.6)	20.1 (6.5)	9
	Med (6,000-10,000)	24.9 (15.3)	56.8 (33.0)	76.2 (6.9)	23.0 (4.1)	4
	Large (>10,000)	31.8 (19.7)	48.7 (32.6)	76.7 (9.6)	21.9 (6.6)	5
Workload ^d	Low (<460)	12.3 (5.4)	77.4 (28.5)	87.4 (6.7)	23.2 (4.8)	5
	Med (460-530)	29.8 (19.1)	49.8 (32.3)	79.0 (10.1)	21.8 (5.3)	8
	High (>530)	20.3 (13.8)	61.3 (25.0)	80.1 (10.6)	17.4 (6.5)	5

^aN free appointments at 0830 per 1,000 registered patients/8 weeks; ^bN appointments per 1,000 registered patients/8 weeks; ^cN per 1,000 registered patients/8 weeks; ^dN consultations at routine consulting sessions per 1,000 registered patients/8 weeks; ^eN A&E self-referrals per 1,000 registered patients/8 weeks; ^fThe number of practices varies according to the availability of data -whether practices were involved in the study, and if so, to what elements of the study they contributed data (see text).

Table 26 Patient dissatisfaction with the arrangements for seeing a doctor, reported general practitioner availability following non-urgent or urgent consultation requests, and A&E self-referral rates in relation to three measures of appointments system functioning, to workload, and to practice list size amongst West Lothian Practices. Figures are averages for practices (sd) classified according to their appointment operation measures, practice list size or workload.

	% Respondents less than 'satisfied' with access arrangements	% Respondents reporting practice attains target for non -urgent availability	% Respondents reporting practice attains target for urgent availability	A&E self-referral rates ^e	Number of practices ^f
Start of day availability ^a	-0.71***	0.78***	0.55*	0.05	17
Appointment provision ^b	-0.54*	0.61**	0.37	0.11	17
Extras ^c	0.67**	-0.75***	-0.35	-0.09	17
Practice list size	0.66**	-0.58*	-0.60*	0.02	18
Workload ^d	0.06	-0.01	0.12	-0.23	17

^aN free appointments at 0830 per 1,000 registered patients/8 weeks; ^bN appointments per 1,000 registered patients/8 weeks; ^cN per 1,000 registered patients/8 weeks; ^d N consultations at routine consulting sessions per 1,000 registered patients/8 weeks; ^e N A&E self-referrals per 1,000 registered patients/8 weeks; ^f The number of practices varies according to the availability of data -whether practices were involved in the study, and if so, to what elements of the study they contributed data (see text). * $p < 0.05$; ** $p < 0.01$ *** $P < 0.001$;

Table 27 Spearman correlation coefficients (rho) examining patient dissatisfaction with the arrangements for seeing a doctor, reported general practitioner availability following non-urgent or urgent consultation requests, and A&E self-referral rates in relation to three measures of appointments system functioning, to workload, and to practice list size amongst West Lothian Practices.

There was considerable variation amongst the 18 practices in the reported availability of a doctor for non-urgent problems (mean $60.7 \pm 7.1\%$ (se) of the sample reporting they could be seen within 2 days), but less variation for urgent problems (mean $81.1 \pm 2.3\%$ (se) of the sample reporting they could be seen the same day). Patients attending A&E were similar to those attending their general practitioner with respect to their perceptions of the availability of a doctor from their practice to see them following an urgent consultation request (Table 28). The two groups differed however in respect of their perceptions of general practitioner availability following a non-urgent consultation request, although the differences were small (51% of patients attending the general practitioner reporting they could be seen the same day or the following day compared with 47% of patients attending A&E, difference between groups $p=0.01$). The proportion of patients reporting that they could be seen within two days following a non-urgent consultation request was negatively related to the proportion of patients seen as 'extras' (Spearman rho -0.79 , $p<0.01$). A similar association does not exist between urgent availability and the proportion of 'extras' (Figure 13). These results will be investigated in more detail in a following chapter.

	Urgent		Non-urgent	
	A&E	GP	A&E	GP
Same day	255 (71)	3429 (68)	46 (13)	744 (15)
Day after	54 (15)	560 (11)	122 (34)	1788 (36)
2-7 days later	15 (4)	286 (6)	165 (46)	1795 (36)
>7 days later	0 (0)	28 (1)	9 (3)	138 (3)
Don't know*	37 (10)	725 (14)	21 (6)	509 (10)
Total	361 (100)	5030 (100)	363 (100)	4976 (100)
U	694708		705334	
p	0.88		0.01	

(*excluded from analysis)

Table 28 The reported availability of a doctor from their practice to see patients following an urgent or a non urgent consultation request. Responses for patients attending general practitioners are compared with those for patients attending A&E using the Mann Whitney U test.

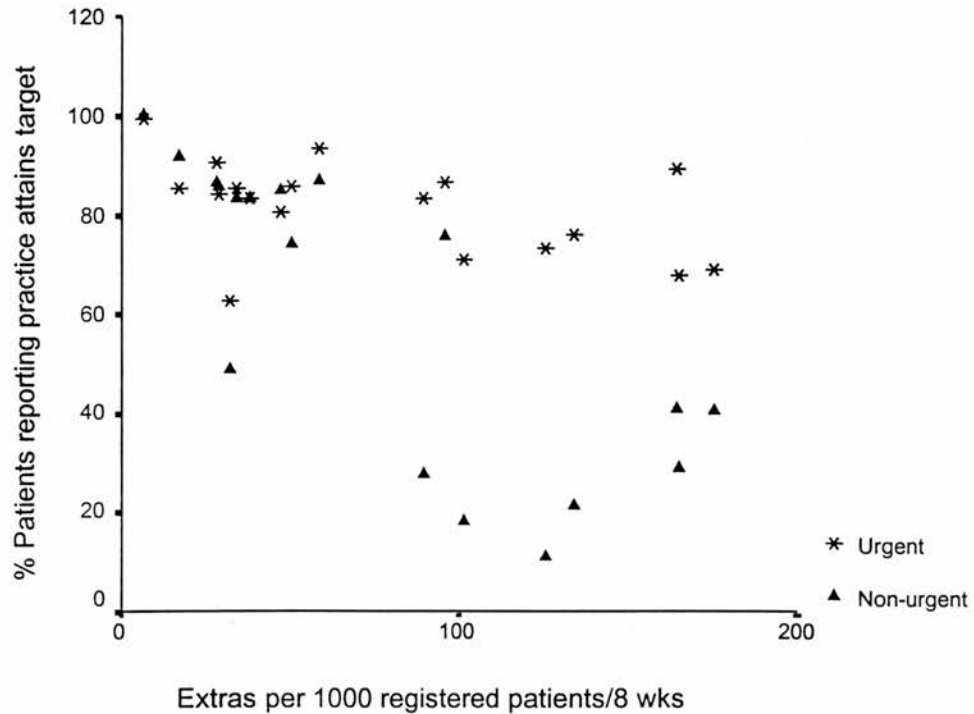


Figure 13 Scatter plot of the number of 'extras' per 1000 registered patients per week against the proportion of patients reporting their practice attains a same day target for urgent appointment requests, or a 2 day target for non-urgent requests

After controlling for casemix, there was no difference observed amongst West Lothian patients who described their problem as an "accident" who attended A&E (234 out of 375 questionnaires), and those who had "accidents" but attended their general practitioner (242 out of 4587 valid responses) in either their perception of their general practitioner's appointments system as measured by their estimates of "normal waiting time" at the surgery (58% v 61% of patients estimating they normally waited less than 15 minutes) or in their perception of the availability of their doctor to deal with urgent problems (71% of both groups reported they could be seen the same day). A higher proportion of patients with accidents attending A&E expressed some dissatisfaction with the arrangements for seeing their general practitioner (31%) than was the case for similar patients attending their general practitioner (19%). Perceptions of medical urgency as reflected in mean medical urgency scores was the same for adult patients attending A&E (34.8 ± 5.5) and participating practices (35.3 ± 5.4 , $F=0.23$, $p=0.15$, 95% confidence interval for

mean -0.2 - 1.1).

5.4 Predictors of patient dissatisfaction with access arrangements to General Practitioners

Amongst patients attending their practice, patient dissatisfaction with the arrangements for seeing the doctor correlated significantly with the following factors after aggregation of the data to practice level (Table 29):

- the three measures of appointment operation,
- the proportion of patients reporting they normally waited in excess of 15 minutes to be seen when attending the surgery,
- the perceived availability of a doctor in the practice to deal with an urgent problem the same day or a non-urgent problem within two days,
- practice list size
- practice administrative and medical staffing

Factors which were investigated, but not correlated with dissatisfaction with consultation arrangements included: the appointment booking interval, the proportion of patients normally anticipating a waiting time in excess of 30 minutes, the Carstairs deprivation score for practice, the percentage of questionnaire respondents who were unemployed, or living in local authority housing, or not having access to a car; the proportion of under 5s or over 65s on practice list; deprivation payments to practice, practice workload at routine consulting sessions.

	Spearman coefficient	Significance
<i>Appointment operation:</i>		
Start of day appointment availability	-0.71	0.001
Appointment provision	-0.54	0.012
Rate of 'extras'	0.67	0.002
<i>Reported availability:</i>		
Non-urgent requests	-0.87	0.000
Urgent requests	-0.64	0.003
<i>Practice staffing:</i>		
Administrative fte	0.75	0.002
Medical fte	0.67	0.003
Anticipated waiting time in excess of 15 minutes (% patients)	0.48	0.025
List size	0.66	0.002

Table 29 Spearman correlation coefficients for reported total practice dissatisfaction (percentage of questionnaire respondents less than "satisfied") against the measures of appointments system functioning used in this study, "perceived availability" for non-urgent and urgent consultation requests, anticipated waiting time, practice list size and practice staffing.

When the measures of potential interest were entered in to a multiple regression model, the two measures of perceived availability accounted for 94% of the variance in dissatisfaction between practices (see later). The number of 'extras' seen was a further independent predictor of dissatisfaction whose addition to the regression model added explanation for a further 3% of the variance.

Patients from larger practices were more likely to report they normally waited in

excess of 15 minutes to be seen (45%) as compared to medium sized or smaller practices (37%, 35% respectively). Larger practice list sizes were thus associated with increased dissatisfaction with the arrangements for seeing the doctor, and a longer anticipated waiting time by patients attending the surgery.

6 Discussion

This prospective study was carried out in West Lothian, a semi-rural area of higher than average socio-economic deprivation as estimated by traditional measures (Carstairs and Morris, 1991). Nineteen of its 26 practices volunteered to take part in the study - representing approximately 80% of the patients in the area. This was a most satisfactory response rate from the practices. It is believed that this response was at least in part related to the study design which involved an initial letter and telephone contact with the senior partner from each practice in West Lothian, prior to a visit to each practice who had expressed a potential interest in becoming involved in the study. The initial visit to the practices permitted a brief presentation of the aims and proposed methodology of the study, and also gave the opportunity for questions and concerns regarding the study to be addressed. Practices were not asked to commit themselves to becoming involved in the study until this personal contact between the researcher and the practice had taken place. Only one practice operated without an appointments system. Practices participating had significantly larger list sizes than those not participating. A pilot study showed that the A&E needs of the practices in this study were largely met by the A&E department on which this study was concentrated.

Quantitative information was obtained about the structure of general practices, and the operation of their appointments systems, as well as the results of two patient surveys which had been developed in the author's own practice during the study. Considering that the questionnaire was distributed by reception staff with no supervision or input on a day-to-day basis from research staff, the response rates obtained at A&E (65%) and in the practices (61%) was judged to be satisfactory. These rates are comparable with a similar recent survey conducted in an A&E department where a response rates of 77% was obtained (Cugnoni, Hormbrey et al.

1994St Bartholemews, London; work supported by researcher in A&E department.) or from general practice (46%) (Poulton, 1996 survey of 1575 patients attending one of three general practices.). Higher rates of patient response have been observed in patient surveys from primary care, Baker (1995) reporting a response of 81% following a postal survey of patients, and Ritchie (1981) achieving an 89% response rate in a major, funded interview survey. A postal questionnaire survey of randomly selected adults from South East England regarding consumer satisfaction with primary care achieved a response rate of 62% (Williams and Calnan, 1991b). In view of these results, and given that this work was not supported on a day-to-day basis at the sites where the questionnaire survey was being undertaken, the overall response rates observed in the present survey were comparable with previously reported work, and judged to be satisfactory.

It was not possible to compare the characteristics of practice attenders who completed questionnaires with those who did not. Attenders at A&E who completed questionnaires were similar with respect to age and sex distribution and source of referral to those who did not complete questionnaires, although the latter group were more likely to be admitted to hospital (and so presumably were more "ill").

Because the arrangements for seeing patients are general to practices rather than to individual general practitioners, the main denominator used in this study has been "the practice." Measures of patient dissatisfaction with consulting arrangements, and patients' perceptions of the accessibility of the doctor were calculated from the aggregated responses of patients obtained during questionnaire surveys carried out in the sample of practices, or in the local A&E Department. Because the questionnaire survey was conducted for only one week, the numbers of patients attending the A&E Department from individual practices was small – 375 patients from the 26 West Lothian practices (of whom only 18 were contributing to the questionnaire survey). Because of this, comparison of individual practices' patients attending hospital or A&E would not have provided meaningful results, and on this account aggregated responses of patients attending A&E were compared with aggregated responses of patients attending their general practitioner in respect of dissatisfaction with consulting arrangements. Since arrangements for consultation tend to be unique to practices, a better study design would have allowed for a matched comparison (by

practice) of practice patients attending A&E with a matched group of patients attending the practice. By obtaining practice information regarding appointment provision and availability, one could account for inter-practice variability. To conduct such a study would involve considerable resources – it is likely that the modest response rate already evidenced at the A&E Department would fall even further should a longer sampling frame be used (Altman, 1991), exacerbating the risk of volunteer bias in the responses obtained. To counter this, one might consider employing a researcher to operate within the A&E Department (and ideally also in the participating practices) to supervise the questionnaire survey. Available resources did not permit this to take place in this study, and one must assume that the modest response rate was predicated by the lack of such an arrangement. Some steps were taken to try to ensure a reasonable response – these included the display of posters in the relevant waiting areas inviting patients to complete the questionnaire, telephone calls to participating reception staff during the study week encouraging the distribution of questionnaires, and postal follow up of non-respondents from the A&E Department.

The ecological fallacy referred to previously (page 181) refers to the risk of overinterpreting data – extrapolating conclusions drawn from the analysis of data aggregated at one level to another, unrelated level. For example, it is unlikely that the effect of age could be effectively examined following aggregation of data to practice level (since the average age in UK practices is likely to be of a broadly similar order). A mean age for a practice might be used to compare (for example) differences between practices in a measure aggregated to practice level, but it would be considerably more appropriate to consider analysing such data at individual patient level – the obvious unit for investigation of the effects of age. Some measures are inherently susceptible to analysis at practice level (such as practice list size), and in this study, the provision and availability of appointments are two such measures. An alternative unit of analysis for these measures might be following aggregation of data to the level of the individual doctor – examining appointment provision and availability for individual doctors within a practice etc. The principal research questions in this study were framed in terms of practice measures, and for this reason, the principal unit of analysis has been the practice. An extensive dataset was collected in the course of the study, and contains elements which would be

susceptible to examination at the patient level of analysis, but this was not the principal aim in addressing the questions implicit in the work of Foroughi and Chadwick (1993) referred to previously.

Questionnaire design regarding the availability of consultations was informed by the work of Butler and Calnan (1987) in two ways. Firstly, similar intervals were used to the intervals they had successfully adopted when questioning doctors about their accessibility to patients. Second, differentiation was drawn between the urgent and the non-urgent situation in relation to consultation requests. Analysis of responses was also informed by the work of Butler and Calnan who compared the (reported) performance of doctors with regard to accessibility with the range of standards which they had suggested. In this study, reported non-urgent and urgent availability were calculated for each practice as the proportion of questionnaire respondents who reported that their practice achieved the pre-set targets of appointment availability the same day following an urgent consultation request, or within two days following a non-urgent consultation request.

6.1 Appointments systems

In line with Hypothesis 8, the provision of routine appointments and the number of appointments unbooked at the start of the working day was observed to vary widely between practices. Previously described work examining a change in appointment operation in one practice identified a target provision of appointment slots of approximately 120% of anticipated demand (section 6.2.1 page 128). Only one practice in this study provided appointments of this type of order, and the majority had an underprovision of appointments relative to demand. In the face of an average routine workload of 66 patients seen per thousand registered patients per week, practices provided an approximately equivalent number of appointments (but with a two fold variation in provision and four fold variation in start of day availability between the 18 practices). Ten of the 66 patients required to be fitted in to the appointments system as 'extras'. However, for individual practices there was no clear relationship between the number of appointments offered and the actual practice workload subsequently achieved. The observation that a tighter match between the number of patients seen and the number of appointments offered is associated with an increase in the number of patients requiring to be seen as 'extras' is in keeping

with the findings from the previous ('flow') study (section 6.2.2, page 162).

Practices with a high rate of appointment provision or a high rate of availability of appointments at the start of the working day had a lower proportion of dissatisfied patients than those with low provision or availability. Individual practices accommodate consultation demands in different ways, and it was known that some practices with low routine appointment provision met additional consultation requests entirely by means of an emergency/duty doctor system for example. To meet anticipated demand fully within an appointments system (rather than incorporating a duty doctor system) an initial provision of appointment slots of around 120% of anticipated demand would appear to be appropriate.

The measures of appointments system functioning used in this study had been successfully used in the earlier flow study (page 141). In this present study, low rates of appointment provision, low rates of appointment availability, and the number of patients seen as "extras" (all adjusted for practice list size) were all found to be associated with dissatisfaction with the arrangements for seeing a doctor, and with the "perceived availability" of a doctor to respond to requests for non-urgent consultations. None of the three measures of appointment operation related to the proportion of patients reporting a normal waiting time in excess of 15 minutes.

Reference has been made previously (page 159) to the discussion regarding the relationship between general practice workload and deprivation. In the present study, there was no relationship between practice workload and (i) traditional measures of deprivation from questionnaire respondents aggregated to practice level or (ii) a measure of local deprivation (Carstairs and Morris, 1991) attributed to practices on the basis of their postcode sector. Like Wilkin et al (1987), this study has used workload measures based on information derived from practices rather than from patients, and in the light of the previous discussion (page 133), it is perhaps not surprising that no association between workload and deprivation has been observed.

6.2 Accident and emergency utilisation

Many studies have investigated how patients decide whether they will seek care from their general practitioners, or from A&E. Russell (Russell, 1977) identified four variables which he claimed conclusively affected the patient's choice to use hospital based care: the distance from the family doctor, the distance from the hospital, the diagnosis, and the patients' age. The influence of geographical proximity has been documented in other studies (Magnusson, 1992; Mckee, Gleadhill et al. 1990; Jones and McGowan, 1989; Ingram, Clarke et al. 1978), and a medical geographer (Knox, 1978) has described the increasing use of A&E services by patients who have limited access to general practitioner services. In general, demographic and socio-economic factors have been considered as of only secondary importance in studies where account has also been taken of the potential role of distance as a factor (Jones and McGowan, 1989; Russell, 1977). Walsh(1995) has suggested that the decision to attend A&E is a perfectly logical process based on perceptions of cost and benefit to the individual patient at a point in time, influenced by a number of external factors, and potentially subject to analysis using the health belief model (cf Figure 2, page 74). In one study examining the use of A&E services by patients in London, 89 out of 217 patients interviewed who had self referred to A&E considered that their problem was urgent and required immediate attention. Only fifteen had tried to contact their general practitioner before attending the A&E department (Singh, 1988), and Singh concluded that patients' perceptions of their problem and of the availability of their general practitioner were the main reasons for attending A&E; he suggested that a patient educational initiative shared between A&E and general practice was an appropriate response to the 'problem' of increasing numbers of patients attending A&E. He had not however included distance as a potential variable in the decision to self refer. In this present study no association was observed between practices' rates of patient self-referral to A&E and patients' reports of doctor availability following an urgent or a non-urgent consultation request, anticipated waiting time when attending the practice, rates of appointment provision or availability (corrected for practice list size), or the proportion of patients seen who were identified as 'extras' by reception staff. Hypothesis 9, based on the observations made by Foroughi and Chadwick (1993) is thus rejected. Furthermore, there was no difference between patients attending A&E compared with patients attending their general practice in the "perceived availability" of their general practitioners to deal with urgent consultation requests or in the proportion of patients anticipating a

waiting time in excess of 15 minutes . This held true after attempting to control for "accident" case mix. In addition, practices with low levels of appointment provision or low numbers of unbooked appointments at the start of the day had similar self-referral rates to A&E as practices had with higher provision or availability. Self-referral rates to A&E did however vary with the distance of the practice from the hospital although general practitioner initiated referral rates did not; on the basis of these data, it is concluded that distance between a practice and A&E is of greater importance in explaining variations in practice A&E self-referral rates than factors relating to doctor availability as measured using the measures of appointment system operation adopted here, or than factors relating to patients' perceptions of doctor availability. Hypothesis 10 is thus accepted.

Data from this present study demonstrate wide variation in use of A&E services by general practices in West Lothian, with a seven-fold variation in rate of self-referral and an un-correlated six-fold variation in rate of general practitioner referral. Distance is confirmed as being of importance as a determinant of A&E self-referral by patients but not of general practitioner referral. In accepting Hypothesis 10 then, it is of importance to note that the findings hold true only for Accident and Emergency *self-referral* rates by patients. The use of Accident and Emergency services initiated by general practitioners does not appear to be subject in the same way to the influence of geographical proximity. Factors explaining general practitioner utilisation rates of Accident and Emergency services would require to be explored in a further study.

Results relating to the potential association between deprivation and A&E use presented something of a difficulty - whilst there appeared to be a significant association when investigated using information available for all practices in the district, this was not confirmed for the smaller number of practices who were participating in the wider study and for whom a wider range of information was available. Practice deprivation scores were attributed to the practice using Carstairs deprivation score allocated on the basis of postcode sector. The relationship between practice deprivation and local (population based) deprivation was not clear, and on this basis, it would be prudent and reasonable to consider deprivation as a potentially important and independent predictor of practice A&E self-referral. It is of note that

recent work examining out-of-hours activity in general practice and Accident and Emergency services from a research group in Nottingham (Carlisle, Groom et al. 1998) has suggested that the high out-of-hours activity recorded from areas close to the A&E Department was accounted for by deprivation rather than proximity. These authors undertook a longitudinal study over a six month period recording out-of-hours contacts for general practitioners and for emergency services. The principal unit of analysis was electoral wards. Practice rates were also examined, although the authors do not make clear how practice deprivation was calculated simply stating that ‘..we calculated Jarman scores for each general practice from the ward scores and the number of patients registered with the practice.’ Once again, there would appear to be sufficient uncertainty round the relative contributions of socio-economic deprivation and distance to suggest that both should be considered as potential variables of significance in future work examining predictors of Accident and Emergency attendance or out-of-hours workload.

A higher proportion of patients attending A&E were dissatisfied with the arrangements for seeing their general practitioner when compared with a sample of patients attending their general practitioner, and this may be related to difficulties encountered in obtaining appointments (Fishbacher and Robertson, 1986). Whilst one might anticipate that this could be accounted for by discontented patients self referring to hospital, it is of interest that levels of dissatisfaction were the same in patients referred by their general practitioner. Referred patients (with acute problems) may have recently experienced difficulty in seeing the doctor following a "same day" consultation request, and so record levels of dissatisfaction similar to patients self referring to A&E. On a similar vein, the hypothesis that *'patients attending Accident and Emergency have a poorer perception of doctor availability than patients attending their general practitioner'* (Hypothesis 13) was confirmed by the finding that 51% of the sample of patients attending their general practitioner reported that they thought they could be seen the same day or the following day following a non-urgent consultation request, compared with 47% of the sample of patients attending the A&E Department. The difference, although statistically significant, was small, and taken together with the observation that the two groups of patients did not differ in respect of their perception of doctor availability following an urgent consultation request suggests that caution should be exercised before

considering this an important effect differentiating patients attending A&E Departments from those attending their general practitioner.

6.3 Patient dissatisfaction

Dissatisfaction amongst patients in general practice has many components (Baker and Streatfield, 1995; Hopton, Howie et al. 1993), and this study has examined dissatisfaction with the arrangements for seeing a doctor. Overall dissatisfaction with consulting arrangements varied between 0% and 50% amongst the patient sample from eighteen practices contributing to the patient questionnaire survey. Five of the practices had 40% or more of respondents reporting dissatisfaction. On the basis of these observations, Hypothesis 11 is judged to be accepted - patient dissatisfaction with and perception of practice consulting arrangements varied widely between this group of geographically related practices. When considering the variation between practices with regard to patients' dissatisfaction with the arrangements for seeing a doctor, although the measures of appointment operation did indeed correlate with the level of dissatisfaction reported by patients from different practices, regression analysis showed that ninety-seven percent of the variance in dissatisfaction between practices was explained by the "perceived availability" of a doctor to respond to urgent or non-urgent consultation requests. A small proportion (3%) of the variance was explained by the proportion of the sample who were identified as 'extras' by reception staff. I shall return to the explanation of patient dissatisfaction with arrangements for seeing a doctor in a later section of this thesis. In this study, two-thirds of respondents estimated that they waited less than 15 minutes to be seen – rather more than the 41% reported by Allen et al (1986). who reported the results of a face-to-face interview survey of 793 randomly selected patients from seven districts in north-west England during 1985 and 1986. Important methodological differences between that study, and the one reported here may account for the differences in the results. Despite these observations, it seems reasonable to accept the proposals of Hypothesis 14, namely that variation between practices in rates of patient dissatisfaction with access arrangements is better explained by variations in patients' perceptions of doctor availability, rather than in measured appointment availability.

The association observed between the total list size of a practice or group and dissatisfaction with the arrangements for seeing a doctor is an important finding. However, the multiple regression analysis suggests that, if list size is a causal determinant of dissatisfaction, this is mainly mediated through its effect on "perceived availability." The practice with no reported dissatisfaction amongst its questionnaire respondents was a single handed general practitioner who operated a personal list. Patients from larger practices anticipated longer waiting times when attending the doctor than did patients from smaller practices. However, some larger practices did have low levels of dissatisfaction which were comparable with those from smaller practices. This highlights the importance of organisational elements in the functioning of appointments systems and practice administration, which are of particular importance in larger practices.

Appointments systems are a strategic device by which general practitioners organise their working day. They are not uniformly popular with patients, and this chapter has explored some of the causes and consequences of dissatisfaction which might arise in relation to their operation. The suggestion made by Foroughi and Chadwick (1993) that general practitioner appointments systems are an important factor in patients' choice of location of care, appears to be more true in terms of patients' perceptions than it is in reality. Patients' perceptions of the way doctors operate are of importance, and this aspect of the study forms the basis of the following chapter.

Reported doctor availability in relation to practice list size and perceptions of medical urgency

1 Summary

- Combined practice list sizes have increased in recent years, but larger practice size may be associated with disadvantage to patients. A study was undertaken to investigate the availability of general practitioners as reported by their patients and the relationship between reported availability and practice list size.
- In a one week questionnaire survey of 8315 patients attending participating practices in West Lothian, Scotland, patients were asked about the arrangements for being seen at that attendance, their perception of doctor availability following an urgent or non-urgent consultation request, and their social and demographic characteristics. The proportion of respondents reporting they could see a doctor the same day following an urgent consultation request, or within two days following a non-urgent consultation request was determined for each practice. Information obtained at patient level regarding perceived doctor availability was compared with patients' perceptions of medical urgency using a medical urgency score calculated for each patient on the basis of their response to questions on the required urgency for medical attention of a number of clinical case vignettes.
- Eighteen out of 26 practices agreed to participate in the study, and an overall response rate of 61% was obtained in the patient survey. There was a wide variation between practices in the proportion of questionnaire respondents who reported that a doctor was available within two days following a non-urgent consultation, but less variation for the reported availability on the same day following an urgent consultation request. A significant negative association was demonstrated between combined practice list size and reported non-urgent, or urgent availability.
- Patient scores for perception of medical urgency had a near normal distribution. Respondents living in local authority accommodation, not owning a car, or who were unemployed had higher scores for perceived medical urgency than those who lived in owner occupied accommodation, or who had access to a car, or who were in employment. Perception of medical urgency explained only a small part of the variance in patients' perceptions of doctor availability following a non-urgent consultation request. Practices with a high proportion of materially deprived patients might consider whether patient educational initiatives should be undertaken in order to assist patients in the evaluation of the urgency of medical problems.
- Substantial variation exists between practices with regard to patients' perceptions of doctor availability, and smaller practices may have advantages in this regard. The feelings and perceptions of patients should be taken into account when planning or reviewing the delivery of primary health care.

2 Introduction

Initial investigations described previously had suggested that substantial variation existed between practices with regard to patient dissatisfaction with the arrangements for seeing a doctor, and also with regard to the operation of general practitioner appointments systems. On the basis of results already presented (Figure 13, page 194) it would seem reasonable to suggest that patients' perceptions of doctor availability may be an important consideration influencing their consulting behaviour.

Since the General Practice Charter of 1965 (Klein, 1979), general practitioners have been encouraged to practise in groups because these seem to offer economies of scale and the most efficient means of delivering care to the population - a situation where the 'long run average costs fall as the scale or volume of activity rises' (NHS Centre for Reviews and Dissemination and Nuffield Institute for Health, Ferguson, B., Rice, N., and Sykes, D.1996). Practice sizes have continued to increase (Department of Health, UK Government Statistical Service1995; Fry, 1993); between 1950 and 1990 the proportion of unrestricted principals working in practices with a list size of more than 7500 patients rose from 24% to 56%.

I have already reported (Table 29, page 196) the impression of an association between patient dissatisfaction with consulting arrangements and practice list size, but noted also that this is likely to be mediated through an effect on patients' perceptions of doctor availability (page 206). Larger practices have been recognised as having difficulty in relation to continuity of care (Freeman and Richards, 1993) although the increasing costs of health care, and the need for sophisticated and costly equipment have promoted the (potentially conflicting) consideration of economy of scale in health care planning (Migue and Belanger, 1974). Green (Green, 1993) reported the results of a qualitative study undertaken in London investigating the views of general practitioners. In her study, semistructured interviews were undertaken with a random sample of 25 single handed general practitioners, and compared with interviews with a systematic sample of 25 general practitioners from group practices. Enhanced continuity of care was seen as an advantage by single handed practitioners, and distinguished this group from the doctors from partnerships who appeared to see this as a less essential feature of general practice. Although

Green claimed that the single handed doctors reported seeing themselves as providing a unique service with distinct advantages for patients, no reference is made to the issue of practice list size. It is not therefore possible to know whether the reported advantages of single handed practice which were identified did indeed exist (this would require to be tested in further investigative work), or whether any such advantages were as a result of the single handed nature of the practice, or as a result of other differences between the groups of doctors interviewed (for example such as variations in practice list size). Having said this, the qualitative nature of the work, along with the careful sampling method applied, permits the conclusion that the study did identify the views of the practitioners involved – the underlying cause of the differences described would require further investigation. Butler and Calnan (1987) in their extensive study of practice list sizes, noted no definite and consistent association between practice list size and expressed standards or reported performance in relation to doctor accessibility, but did observe that general practitioners with smaller list sizes did report improved accessibility of services for at least some areas of practice. Given these observations which tend to suggest that smaller practices may afford particular advantages to patients in relation to doctor accessibility, the relationship of reported doctor availability and practice list size was explored in more detail.

Whilst the experience of symptoms is a universal phenomenon, it is recognised that in only a minority of cases is that experience translated into a request for medical care (Hannay, 1979). The health belief model (Rosenstock, 1966) is one of a number of possible theoretical frameworks for considering the circumstances under which that transition occurs. It is not clear however what factors might influence the manner in which the request for care is delivered, in particular, what factors influence the degree of urgency associated with a patients request for a consultation. In this study, some of the factors associated with patients varying perceptions of medical urgency are explored, and patients' perceptions of medical urgency are examined as a possible factor influencing their perceptions of doctor availability.

3 Research questions and hypotheses considered

Previous work has suggested that considerable variation exists between practices in relation to their use of Accident and Emergency services, and in the operation of their appointment systems. Patient factors have also been identified as an important component of accessibility. Since these studies have investigated differences between practices as the basic unit of analysis, and since practitioners from smaller practices report advantages in relation to that type of practice, it seemed relevant and important to consider differences between practices in patients reports of doctor accessibility, and to investigate practice factors which might begin to account for differences between practices in their patient' perceptions of doctor availability.

What variation exists between practices in their patients' perceptions of doctor availability?'

'Substantial variation exists between practices in relation to their patients' perceptions of doctor availability'

• *Hypothesis 15*

Do practices with smaller list sizes have any advantage over larger practices with regard to their patients' perception of doctor availability?

'Practices with smaller list sizes have consulting arrangements associated with improved patient perceptions of doctor availability'

• *Hypothesis 16*

Is there any association between patients' perceptions of medical urgency and their perception of doctor availability?

'Patients with a heightened sense of medical urgency have an increased perception of doctor availability'

• *Hypothesis 17*

4 Methods

4.1 Variation between practices in patients' perceptions of doctor availability

Information was obtained from 5094 patients attending one of 18 West Lothian practices who were contributing to the larger study described previously examining the relationship between the use of A&E services, patient dissatisfaction with access arrangements and operation of GP appointments systems. Practices had provided information about their list size and medical staffing arrangements. Patients completed questionnaires in the surgery whilst waiting to be seen during one week in early 1994. Respondents were asked their date of birth, and about their perception of the availability of their doctor (see detailed methodology, section 4.3, page 179). As before, a target availability of patients being seen the same day for urgent problems, and within two days for non-urgent problems was adopted. The percentage of the questionnaire respondents reporting that their practice achieved these targets was determined for each practice

4.2 Practice list size and reported availability

The association of practice list size with the percentage of patients reporting that their practice achieved the pre-defined targets for urgent or non-urgent doctor availability was investigated by using scatter plots and analysis of correlation. For reasons outlined previously (page 198), practices rather than patients were chosen as the unit of analysis for this part of the investigation.

Respondents were also asked about the arrangements for their current attendance at the practice - whether an appointment had been made in advance (and if so whether this was for the day they wanted), or whether they had been advised to 'come and wait' or had simply presented, hoping to be seen. The one practice with no appointments system was excluded from this analysis; for the 17 other practices, the percentage of patients reporting they had received an appointment for the day they wished was determined, and this was related to the percentage of the questionnaire sample reporting that their practice achieved the availability targets.

4.3 Patients' perceptions of medical urgency and reported doctor availability

To investigate the possibility that patients' perceptions of doctor availability might be associated with their perception of medical urgency, the relationship between patients' medical urgency scores (see detailed methodology on page 181) and patients' reports of doctor availability in their practice following a non-urgent or an urgent consultation request was investigated. Average urgency scores were compared for each category of response to the questions on doctor availability following urgent or non-urgent consultation requests. A measure of deprivation was calculated for each individual by adding scores for employment (1, in paid employment; 2, unemployed), housing tenure (1, owner occupied; 2, council or rented accommodation), and car ownership (1, access to car; 2, no access to car). Average urgency scores were compared for patients grouped by their deprivation status. For this element of the investigation therefore, patients rather than practices were the unit of analysis.

4.4 Analysis

Data obtained were analysed using SPSS (SPSS Inc, 1990). Simple associations between variables aggregated to the practice level were examined by Spearman rank correlation coefficients or Pearson correlation coefficients. Two tailed significance of Pearson partial correlation moment values were calculated when correcting for questionnaire response rates. The average list size of participating practices was compared with the average list size of non-participating practices using Student's t-test. Average urgency scores were compared for groups of patients with similar characteristics using t tests, and analysis of variance. The Kruskal-Wallis one way analysis of variance (F statistic) was used to compare patients' perceptions of urgency in the urgent or non-urgent situation for patients grouped by their deprivation status. Distributions of scores were compared using chi squared tests, and correlation between variables was examined using Spearman's rho.

5 Results

The 18 practices which agreed to be involved in the patient questionnaire survey had

a mean list size of 6469 patients (range 1596 to 11478), compared with 6333 (range 1779 to 12490) for non-participating practices (difference not significant, $p=0.93$); all but one of the 18 practices operated an appointments system. The average number of medical full time equivalents (excluding locums and trainees) was 3.9 ± 0.5 (se) per practice, and the average list per medical full time equivalent was 1787 ± 107 (se) patients. During the one week study period, the 17 practices participating in this part of the study saw 8315 patients, from whom 5094 completed questionnaires were obtained (average practice response rate 61%, range 36-97%). There was no significant association between practice list size and questionnaire response rate. Whilst a significant difference existed between practices in the mean age of respondents (see page 183), the age of the respondent was not a predictor of their perception of doctor availability for urgent (Eta 0.04, $p=0.29$) or non-urgent (Eta 0.04, $p=0.22$) appointment requests.

Of 5094 questionnaire respondents, 4999 (80%) were from practices operating an appointments system; of these, 4535 (94%) had been given a specific appointment time, 210 (4%) had been advised to 'come and wait', and 83 (2%) had arrived unannounced¹⁴. Appointments had been given for the day requested to 3558 (80%) patients (range for 17 practices 70-95%) and "not for the day requested" to a further 872 (20%) patients¹⁵.

5.1 Variation between practices in patients' perceptions of doctor availability

The percentage of questionnaire respondents reporting that their practice met the targets for doctor availability is presented in Figure 14 which portrays considerable variation amongst the 18 practices in the reported availability for non-urgent problems (mean $60.7 \pm 7.1\%$ (se) of the sample reporting they could be seen within 2 days), but less variation for urgent problems (mean $81.1 \pm 2.3\%$ (se) of the sample reporting they could be seen the same day).

¹⁴ 171 missing responses.

¹⁵ 105 missing responses.

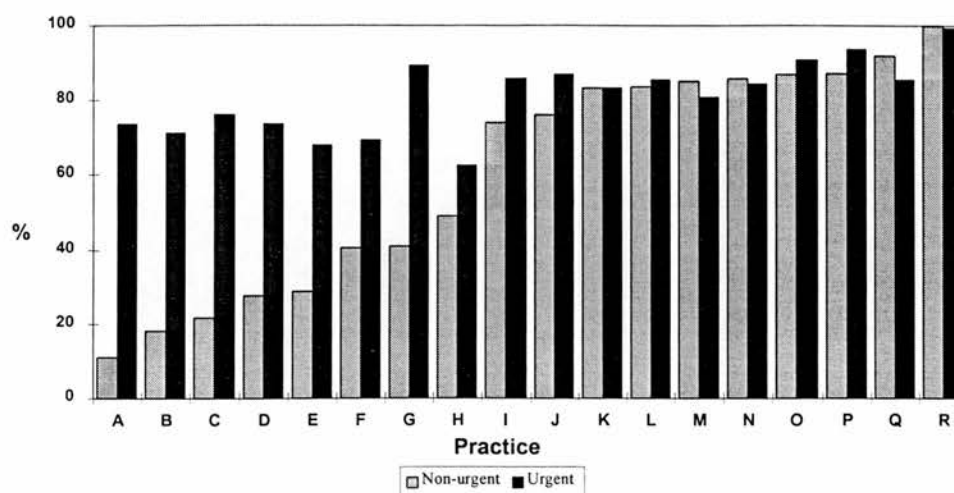


Figure 14 Reported doctor availability: Percentage of patients reporting practice meets target for urgent or non-urgent availability

5.2 Practice list size and patients' perceptions of doctor availability

The association of practice list size with the reported availability of a doctor to deal with urgent requests the same day, or non-urgent appointment requests within two days is presented in Figure 15 and Figure 16. There was a statistically significant negative association between list size and the percentage of respondents reporting that the practice achieved the pre-defined target for availability for urgent problems (Pearson correlation coefficient (r) -0.62, $P=0.006$) and non-urgent problems (Pearson r -0.53, $P=0.03$). Correcting for varying response rates did not alter this association significantly (Urgent: Pearson partial correlation moment $r=-0.61$, $p=0.009$; Non-urgent: $r=-0.53$, $p=0.03$). There was no association between practices' average number of patients per whole time equivalent doctor and its patients' perceptions of doctor availability in either the urgent ($r=0.34$, $p=0.16$) or the non-urgent ($r=0.25$, $p=0.31$) situation.

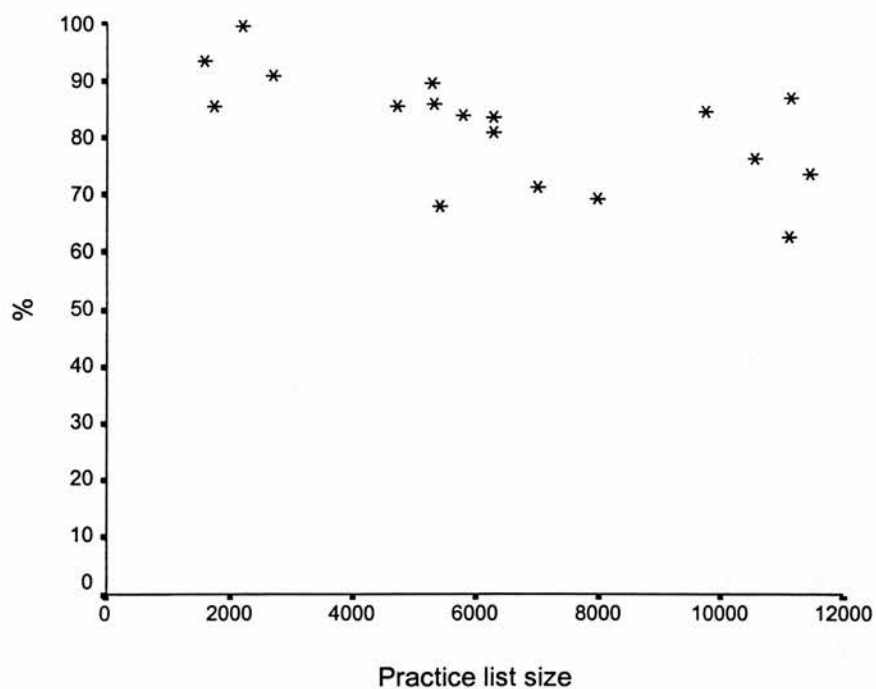


Figure 15 List size and perceived doctor availability (% of practice patients reporting doctor available the same day following an urgent consultation request)

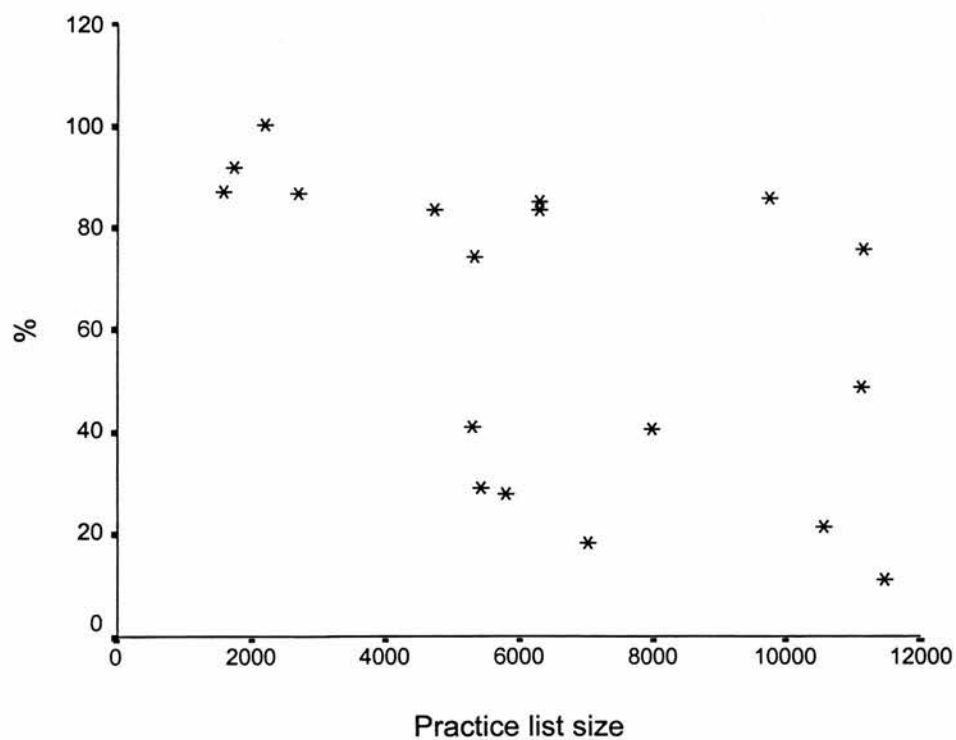


Figure 16 List size and perceived doctor availability within two days for non-urgent appointment requests

There was a significant association between the percentage of the questionnaire respondents in each practice reporting they had received an appointment for the day they had requested and the percentage reporting a practice's perceived attainment of target times for availability for both urgent and non-urgent appointment requests (Urgent: Pearson $r=0.75$, $p<0.001$; Non-urgent Pearson $r=0.84$, $p<0.0001$).

Patients who reported that their practice did not meet urgent or non-urgent availability targets did not differ from those who reported that their practice did meet these targets with respect to reported use of A&E or general practitioner out-of-hours services in the last 5 years.

5.3 Patients' perceptions of medical urgency and reported doctor availability

Patients' medical urgency scores had an approximately normal distribution (mean 24.8, sd 5.4, Figure 17). Average medical urgency scores were significantly lower (representing a heightened sense of urgency) for patients who were unemployed, or who lived in council accommodation, or who did not have access to a car when compared with those who were employed, or who lived in owner occupied accommodation, or who had access to a car (Table 30). Although actual differences in scores between these groups of patients were small, multiple regression confirmed these as independent predictors of patients' perceptions of medical urgency, although their combined influence was associated with an R^2 of only 0.02. There was no difference in average medical urgency scores between patients who had made an appointment prior to their attendance compared with those who had not made an appointment (24.9 v 24.5, p 0.62), and between male and female patients (24.7 v 24.9, p 0.30).

There was evidence of a small but significant relationship between urgency scores and deprivation with the most underprivileged patients having the most heightened sense of medical urgency (Table 31). There was also a relationship between medical urgency scores and reported perception of doctor availability following a non-urgent consultation request (Table 32). Respondents with higher perceptions of doctor availability following a non-urgent consultation request had a significantly higher

perception of medical urgency (lower average urgency score). Although the trend is statistically significant, the variation in medical urgency scores only accounts for about 1% (rho squared) of the variance in patients' perceptions of non-urgent doctor availability. There was no association between socio-economic deprivation and patients' perception of doctor availability in either the urgent (chi squared 7.6, df 3, $p > 0.05$) or non-urgent situation (chi squared 1.3, df 3, $p > 0.05$).

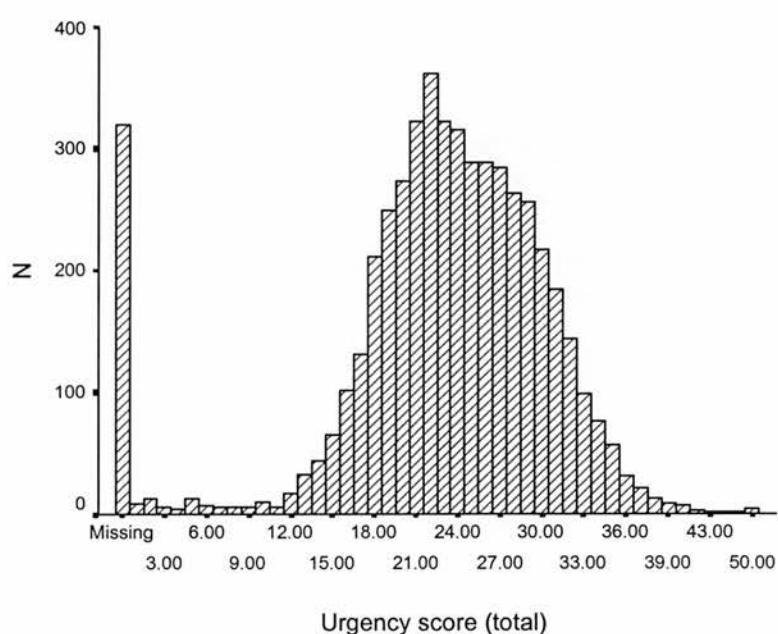


Figure 17 Distribution of medical urgency scores obtained from questionnaire survey of 4980 patients (plus 320 missing values) in 18 practices. (mean 24.2, sd 5.8)

	Employment status		Car ownership		Home ownership	
	Employed (n 2580)	Unemployed (n 1724)	Access car (n 2909)	No access car (n 1361)	Owner occupier (n 2421)	Council (n 2020)
Mean urgency score	25.2 (5.4)	24.3 (5.4)	25.2 (5.3)	24.1 (5.6)	25.2 (5.2)	24.5 (5.6)
t	5.1***		5.9***		4.4***	

*** $p < 0.0001$

Table 30 Average urgency score (sd) for groups of patients categorised by employment status, car ownership, and home ownership

Deprivation score (see text)		Average urgency score (mean, sd)		N
3	(no evident deprivation)	25.5	5.1	1317
4		24.9	5.3	1248
5		24.5	5.6	872
6	(deprivation in each of three modalities)	23.9	5.4	556

(F 14.02 P<0.001).

Table 31 Average urgency scores for respondents categorised by deprivation score

Reported availability	Non-urgent			Urgent			
	Mean urgency score	sd	N	Mean urgency score	sd	N	
Same day	24.4	5.6	558	24.7	5.3	3082	
Day after	24.2	5.2	1658	24.4	5.5	520	
2-7 days later	25.5	5.4	1716	25.3	5.9	266	
>7 days later	25.7	5.9	129	24.4	5.5	26	
Don't know	<i>excluded</i>						
All	24.8	5.4	4061	24.7	5.4	3894	
			F 19.8 p<0.001				F 1.8 p=0.14

Table 32 Average (sd) urgency scores for N patients responding to questions on the perceived availability of a doctor following a non-urgent or urgent consultation request

6 Discussion

Participating practices were representative of all practices in West Lothian with regard to list size, and the one week questionnaire survey carried out in these practices gave a satisfactory overall response rate (page 213). Respondents completing the questionnaire were similar to the local general population with regard to car and home ownership, and a comparison of age profiles demonstrated that the sample of respondents had a similar age profile to that of participating practices.

6.1 Variation in reported doctor availability

Using a standard previously adopted when considering doctor availability (Butler and Calnan, 1987), a ten fold variation in doctor availability for non-urgent problems was reported by patients from 18 different practices. This is a substantial variation (in keeping with Hypothesis 15), with potentially important implications on decisions taken by patients as to whether, where, when and whom to consult.

Despite the wide variations between practices in perceived doctor availability, an

average of 81% of patients reported they could usually get an appointment within 24 hours of an urgent request, a figure rather more than that reported by Cartwright and Anderson (1981) (63%) or Ritchie et al (1981)(see page 33) (45%). Both of the latter studies involved interviewing a random stratified sample of adult patients identified from the electoral register compared with a sample of patients consulting the doctor in this study. Study design may thus account for some of the difference. Here, 80% of questionnaire respondents stated they had received an appointment for the day they wanted and there was a close association between practices' reported ability to provide such an arrangement and the reported availability of a doctor in the urgent or non-urgent situation. This association was taken to reflect a good degree of internal consistency in these items of the questionnaire.

6.2 List size and reported availability

I have already reported (page 206) the impression of an association between patient dissatisfaction with consulting arrangements and practice list size, and this study has now demonstrated a significant negative association between practice list size and the perceived availability of a doctor to deal with urgent or non-urgent consultation requests. It is perhaps surprising that this relationship is so marked for perceived availability for urgent problems - one might have anticipated this to be independent of list size and to be determined mainly by "clinical" factors. Earlier work (Table 25, page 190) had suggested that patients attending A&E were less satisfied with the arrangements for seeing their doctor than patients attending their general practitioners, and that dissatisfaction with consulting arrangements was significantly associated with poorer perceptions of general practitioner availability. From regression modelling, it appeared that list size may be a causal determinant of dissatisfaction mediating its effect through an effect on "perceived availability" and the results presented here confirm the association of practice list size and the perception of doctor availability (Hypothesis 16) , and offer support for the suggestion that smaller practice list sizes have advantages with regard to patients' perceptions of their doctors' availability. Butler and Calnan (1987) have previously reported findings from a survey of 1300 general practitioners and observed that "with increasing list size, doctors were more likely to feel that patients should be able to get an appointment with any doctor on the same day, and were also more likely to report that patients in their own practices would be able to do so". Their study used mean personal list size rather than practice list size, and relied on doctors' reports

rather than patients. Another study (Bradley and Gude, 1992), surveying doctors from 245 out of 267 practices in the south-west of England, reported that 80% of practices claimed to be offering a non-urgent appointment to patients on the same, or the next day. This finding, obtained from doctors' reports, is at odds with the reports of the patients in this study where only 61% thought they could be seen the same or next day following a non-urgent consultation request. These earlier studies were carried out in different parts of the country, and the socio-economic characteristics of the practices contributing to the studies cannot be readily compared. Despite this, the apparent discrepancy between doctors' and patients' perceptions of availability would appear to warrant further study.

In this study, there was no association between list size corrected for the numbers of doctors in the practice and patients' perceptions of doctor availability. In the presence of an association between uncorrected list size and perceived availability this suggests that any such association is independent of medical staffing levels. Green (1996) has reported the views of a single handed general practitioner from South London who suggested that that type of practice was associated with improved access for patients, the effect being partly mediated by the absence of an appointments system. It is possible that the differences in perceptions described in this study might reflect varying expectations for delivery of care amongst patients from differing sized practices, rather than real differences in availability of services. Alternative explanations for the observed association might include a less personal approach to care perceived by patients in larger practices, some element of receptionist operation (as yet undefined, but considering for example the relationship between doctors and reception staff in smaller practices, or in the more diverse roles one might anticipate receptionists in smaller practices as having), or greater administrative flexibility in smaller practices which might require less rigid administrative procedures. Freeman and Richards (1993) have observed that patients receiving more personal continuity of care were likely to have booked their most recent appointment further in advance than patients receiving less personal continuity; they also highlighted the difficulties inherent in providing both personal continuity of care and freedom of choice for patients. Hjortdahl and Laerum (1992), following a large survey of Norwegian primary care patients in which a response rate of 78% was achieved, reported that patient satisfaction was associated with the

provision of personal, continuous care.

List size has been demonstrated to be negatively associated with consultation length¹⁶ (Groenewegen, Hutten et al. 1992; Butler and Calnan, 1987), but Butler and Calnan's detailed study of list sizes concluded that whilst smaller list sizes might result in advantages to patient care (for example through longer consultation length), the evidence examined suggested that not all the potential time advantage gained through smaller list and practice sizes would be passed on to patients. In the light of that observation, it is not possible to predict the likely impact of reducing practice list size on patients' perceptions of doctor accessibility without careful consideration of other factors which may also be operating.

6.3 Patients' perceptions of medical urgency and reported doctor availability

What factors are of importance in influencing patients' perceptions of medical urgency? This study aimed to address that question with particular reference to the potential influence of socio-economic deprivation. The results of a questionnaire survey of a sample of patients attending their general practitioner are reported. An urgency score was calculated for each patient. This was derived from responses to a question on how soon the subjects of a short series of clinical vignettes should be able to see their doctor. The overall response rate of 61% was judged to be satisfactory, and the results were judged to be generalisable on the basis that the sample of respondents were representative of the local population in respect of car and home ownership.

Numerous studies have examined the decision taken to consult a doctor. Rosenstock's health belief model (Rosenstock, 1966), suggests that such behaviour is predictable and occurs as a result of a set of core beliefs which have been refined through time. Mechanic (1968) identified ten variables associated with seeking medical advice, one of which was the perceived seriousness of the symptoms experienced. In a review of literature relating to 'Why people consult the doctor', Campbell and Roland (1996a) identified a considerable number of factors

¹⁶ also discussed previously (page 164)

influencing that decision. They identify the importance of socio-economic, demographic and family factors as well as access issues in the decision making process. Hopton et al (1996) noted the importance of considering the psychosocial context in which out-of-hours care takes place, and the importance of previous experiences with health services and contacts with health professionals in users' explanations of current use in the health service. Accepting this, one would have to exercise caution in an over-simplistic analysis of patients' perceptions of medical urgency, and recognise the importance of contextualising these perceptions within the conditions prevailing for a given patient at a point in time.

Quantitative (Morrison, Gilmour et al. 1991; Wyke, Hewison et al. 1990; Campion and Gabriel, 1985) and qualitative (Kai, 1996) methodologies have been used to examine the decision to consult in children and their families. Wyke et al (1990) showed that a doctor was likely to be consulted if symptoms were judged to be severe, or if the (cough) symptom had affected the child's behaviour. In follow up work she went on to investigate the relationship between socioeconomic status, reported symptom severity, and the reactions of parents to hypothetical sets of symptoms. Parents of children from deprived families reported worse coughs than other parents, and these authors concluded that children from such families suffer from worse respiratory illness than those from non-deprived families. Kai's work (1996), carried out in a disadvantaged inner city setting, examined the concerns of parents about their pre-school children when they were acutely ill. Parents' concerns were expressed within the context of 'keenly felt pressure, emphasising parents' responsibility to protect their children from harm', and related to parents' sense of personal control when faced with illness in their children, and to the perceived threat posed by an illness in those children.

Examining a series of children identified as high users of out-of-hours services in Glasgow, Morrison et al (1991) (using a series of clinical vignettes based on a scale developed by Campion and Gabriel (1985) to assess mothers' perceptions of seriousness of clinical situations) have reported that children from poorer families are seen more frequently out-of-hours than those from more affluent families. It is of note that 'seriousness' of symptoms was addressed, not (as here) the concept of 'urgency'. The relationship between these two variables remains undetermined.

Whilst the literature to date has tended to refer to the former, I would suggest that, at least from the perspective of potential impact on the appointment system, these are separate concepts, and that patients will effectively distinguish the two. Such a hypothesis would provide a fascinating basis for further investigative work. Mothers of children who were high users of services were not more likely to consider the vignette situations more serious than the mothers of control children, but were more likely to make contact with a doctor. As in the studies referred to previously, contact with a doctor would be made when the symptoms were judged to represent an emergency, something they considered serious, or something they felt unable to cope with.

Only one study has examined the concept of the urgency of consultation requests in any detail (Fishbacher and Robertson, 1986). In that study, an audit of appointment provision and availability, the age of the patient was found to be related to the urgency of the consultation request – the younger the patient, the greater the likelihood of a request for a same-day appointment. In the under five age group, 43% of requests were presented as urgent, compared with only 5% of patients in the over 65 year age group. That same work highlighted a mismatch between doctors and patients' perception of urgency. Doctors judged that 77% of patients requesting an urgent (same day) appointment could have waited longer (although the grounds on which these judgements were made was not explored) in contrast with 93% of patients making a non-urgent appointment request. Thus, although numerous studies have examined determinants of consultation behaviour, only one has examined the determinants of the degree of urgency attached to a consultation request, and none have examined the relationship between the perceived seriousness of symptoms and perceived urgency.

In this study, an urgency score was calculated for each patient based on their response to their perception of medical urgency for each of ten short clinical vignettes. It might have been of interest and value to use a modified version of Champion and Gabriel's instrument (1985) to assess urgency, but the availability of this instrument was not identified until the present work was completed. Using the instrument described, patient scores adjusted for the number of valid responses were observed to have a normal distribution. Respondents living in local authority

accommodation, not owning a car, or who were unemployed had higher scores for perceived medical urgency than those who lived in owner occupied accommodation, or who had access to a car, or who were in employment. Further support for this observation was obtained by the observation of an association between a measure of multiple deprivation and perceptions of urgency. Deprived patients thus appeared to have a heightened sense of medical urgency. Whether this a cultural effect, a response to systematic variation in health education disadvantaging the poor, or the result of experiencing the increased morbidity known to be associated with deprivation (Wyke, Hewison et al. 1991) cannot be determined from this study. It is tempting to suggest that some combination of these factors results in an increased sense of helplessness and a perceived requirement for urgent medical help. Although the differences between groups of patients were small, the possible impact on primary care workload might be evidenced through increased frequency of requests to be fitted into appointments systems as 'extras' amongst poorer patients. Such a hypothesis would require testing in a further study.

Whilst a statistically significant difference was observed between medical urgency scores in relation to patients' perceptions of doctor availability following non-urgent consultation requests (theoretically providing a basis for accepting Hypothesis 17), the effect was weak, and can probably be discounted for practical purposes - variation in patients' perceptions of medical urgency accounted for only 1% of the variance in the perception of doctor availability in the non-urgent situation. On this basis, it would seem prudent and reasonable to reject Hypothesis 17 in favour of other, more important influences. It seems likely that other factors, perhaps relating to the organisation and administration of the practice (Baker and Streatfield, 1995; Campbell, 1993), are likely to have considerably greater influence on perceptions of doctor availability. Practices, especially those with a high proportion of materially deprived patients, might consider whether patient educational initiatives should be undertaken in order to assist patients in their evaluation of the urgency of medical problems.

Practice organisation is of importance at a time when the process of care is influenced by the need to achieve targets. Distinction should be drawn between the 'availability' of services, and their 'accessibility'. The former suggests simply provision of a service, the latter relates more to the perception of that service by the user, and the ease with which that user might avail themselves of the service. The "distance between general practitioners and their patients" (Robson, 1995) may not simply be a geographical one, and the more intangible feelings and perceptions of patients should be accounted for when considering changes in practice organisation. This study suggests that smaller practices have advantages with regard to patients' perceptions of doctor availability. Patients' perceptions of doctor availability are only marginally influenced by their perception of medical urgency, although this latter measure was observed to be higher amongst more deprived patients. The pressure to increase practice size on administrative and financial grounds may ultimately prove to be disadvantageous to patient expectations and desires, and the results presented here may have implications for national policy regarding practice list sizes.

A practice based model for patient dissatisfaction with consulting arrangements

1 Summary

- Numerous variables have been identified through the course of these studies which correlate with patient dissatisfaction with the arrangements for seeing their doctor. This study explores these variables in detail using regression modelling to identify independent predictors of patient dissatisfaction with these arrangements.
- Of eight variables investigated, three (the percentage of patients reporting that their practice achieved the pre-defined targets for urgent or non-urgent doctor availability, and the numbers of patients identified as 'extras') explained 97% of the variance between practices in patient dissatisfaction with consulting arrangements.
- Further regression modelling confirmed the importance of practice list size as an independent predictor of patients reports of doctor availability following a non-urgent or an urgent consultation request. The numbers of patients seen as 'extras' was an independent predictor of patients reports of non-urgent doctor availability.
- A model has been developed following studies carried out in West Lothian, Scotland in which patient dissatisfaction with practices' arrangement for seeing a doctor appears to be predicted by those patients' perceptions of the availability of their doctor following an urgent or a non-urgent consultation request, and by the numbers of patients identified as 'extras' by reception staff. Patients' perceptions of doctor availability are thus of importance, and are themselves predicted by the size of the practice to which the patients belong, and by the numbers of patients seen as 'extras'.

2 Introduction

The previous studies, initially designed to define the operation of appointments systems in one health district of Scotland have given insights into practice characteristics associated with variation in patient perceptions of doctor availability following non-urgent or urgent consultation requests and into influences on patient dissatisfaction with arrangements for seeing a doctor. Despite investigation of a large number of variables as potentially influencing patient dissatisfaction with consulting arrangements, multiple regression modelling identified only patients' perceptions of doctor availability following urgent or non-urgent consultation requests and (to a lesser extent) the number of patients seen as 'extras' as independent predictors of dissatisfaction with consultation arrangements.

Practice list size has been identified as a contributing variable predicting dissatisfaction with consultation arrangements, but apparently doing so by an effect on patients' perceptions of doctor availability. Other factors have also been identified as contributing to a model in which patient dissatisfaction with consulting arrangements is secondary in effect to patients' perceptions of doctor availability, and to three measures of the operation of general practice appointments systems.

To investigate variables which might influence patients' perceptions of doctor availability, further regression modelling was carried out using information made available by the 17 practices which had contributed to the study which operated an appointments system, and which had also contributed to the questionnaire survey of patients attending the practice over a one week period. This investigation thus brings together and develops the associations identified previously examining the following hypothesis:

'Dissatisfaction with practice consultation arrangements can be successfully explained on the basis of a model incorporating significant variables identified in the earlier phases of the studies'.

• *Hypothesis 18*

3 Method

Variables for a number of practice based measures were available at the conclusion of the larger study examining the operation of general practitioner appointments systems in one health district (Table 33).

Practice:

Staffing arrangements	Medical fte Administrative fte
Deprivation	Carstairs deprivation score Deprivation payments
List	List size % under 5s % elderly (>65 years)
Appointment operation (rates corrected for list size)	Appointment provision Start of day availability Extras
Patient 'flow'	% patients anticipating waiting times in excess of 15 or 30 minutes (separately) Appointment booking interval
Workload	Patients seen in routine consulting sessions
Socio-economic profile of patients (from survey)	% with no car % unemployed % council housing tenants

Table 33 Variables investigated as potentially influencing patients' perceptions of doctor availability

A number of these variables have been shown to be correlated with patients' dissatisfaction with the arrangements for seeing a doctor, but the interaction of these variables has not been fully described. In this study, patient dissatisfaction with consultation arrangements is the key dependent variable under investigation, and regression modelling with stepwise removal of non-contributing variables was undertaken with a view to determining independent predictors of patient dissatisfaction with consulting arrangements. Once again, the practice rather than the individual patient form the unit of investigation, with investigated variables having been aggregated to practice level. Variables investigated as potential candidates predicting dissatisfaction with consulting arrangements were those which had been highlighted as correlating with practice dissatisfaction scores earlier in the investigation.

Having identified independent predictors of patient dissatisfaction with consulting arrangements, further regression modelling was undertaken to identify variables independently contributing to an explanation of the newly identified predictors - a second level regression. A similar procedure to that already described was used to identify potential second-level independent predictors.

4 Results

Table 34 highlights practice variables which have already been shown in this thesis to be correlated with patient dissatisfaction with the arrangements for seeing a doctor and/or the two measures of reported doctor availability.

	Dissatisfaction	Urgent availability	Non-urgent availability
Workload			
Admin FTE	■	■	■
Medical FTE	■	■	■
Appointment provision			
Appointment availability	■	■	■
Extras	■		■
Dissatisfaction		■	■
Wait normally >15 mins	■		
Wait normally >30 mins			
Appointment interval			
Urgent availability	■		■
Non-urgent availability	■	■	
List	■	■	■
% <5			
% >65			
Carstairs Deprivation		■	
Deprivation payments			
% unemployed			
% no car			
% council housing			

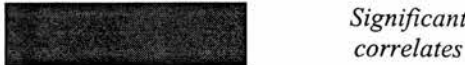


Table 34 The principal correlates of patient dissatisfaction with consulting arrangements and reported urgent or non-urgent doctor availability

4.1 First model - patient dissatisfaction with consultation arrangements

Eight variables were entered into the regression model as potential independent predictors of patient dissatisfaction with consulting arrangements, and the results of this model are presented in Table 35. The percentage of patients reporting that their practice achieved the pre-defined targets for urgent or non-urgent doctor availability, and the numbers of patients identified as 'extras' together explained 97% of the variance between practices in patient dissatisfaction with consulting arrangements.

	B*	T	sig T	R²
Dissatisfaction with consulting arrangements				
% reporting non-urgent availability target attained	-0.62	-10.7	0.000	0.86
Rate of 'extras'	-0.10	-4.4	0.001	0.09
% reporting urgent availability target attained	-0.42	-3.6	0.005	0.03
Combined R²				0.97

**B is the regression co-efficient*

Table 35 Regression model for patient dissatisfaction with consulting arrangements

Variables identified as not being independent predictors of patient dissatisfaction with consulting arrangements included the practice lists size, administrative and medical staffing arrangements (numbers of full time equivalents), the proportion of patients normally anticipating a waiting time in excess of 15 minutes, and the number of appointments available at the start of the working day corrected for list size.

4.2 Second model -reported availability

Having identified three independent predictors of patient dissatisfaction with consulting arrangements, a second level regression was carried out to examine potential influences on the variables relating to reported doctor availability. Spearman correlation identified the following variables as being of potential interest

with regard to predicting patients' reports of availability of a doctor in their practice following a non-urgent or urgent consultation request (dissatisfaction with consultation arrangements was highly correlated, but excluded as it was the key dependant variable investigated above):

	Non -urgent availability	Urgent availability
Practice list size ¹⁷	-0.58*	-0.60**
Administrative staffing (fte)	0.67**	-0.59*
Medical staffing (fte)	-0.56*	-0.55*
Appointment provision	0.61**	0.37
Appointment availability	0.78**	0.55*
Numbers of 'extras'	-0.75**	-0.35
Carstairs score for practice	-0.34	-0.49*

*Spearman's rho: * p<0.05; ** p<0.01;*

Regression modelling with stepwise elimination of variables not contributing to the regression model showed that independent predictors of non-urgent availability included the numbers of patients classified as extras (corrected for list size) and practice list size. Variables excluded as independent predictors of general practitioner availability following a non-urgent consultation request included administrative and medical staffing arrangements expressed as full time equivalents, and the number of appointments unbooked at the start of the working day (corrected for list size).

¹⁷ The three variables relating to the size of the practice (list size, medical staffing, administrative staffing) were all highly correlated with each other (all $p < 0.01$). Baker and Streatfield(1995) have previously suggested that list size might be used as the principal measure of investigation in circumstances where variables relating to list size are observed to correlate with each other. In this study, this approach was not adopted as it seemed reasonable to suggest that variations in patients' perceptions of doctor availability might operate independently of practice list size and may be potentially influenced by the numbers of administrative or medical staff available.

	B*	T	sig T	R ²
Non-urgent availability				
Rate of 'extras'	-0.32	-3.85	0.001	0.61
Practice list size	-0.02	-2.32	0.04	0.13
Combined R ²				0.74
Urgent availability				
Practice list size	-0.002	-3.2	0.008	0.46

*B is the regression co-efficient

Table 36 Regression model for independent predictors of reported doctor availability following a non-urgent or urgent consultation request

The only independent predictor of general practitioner availability following an urgent consultation request was practice list size (Table 36); factors excluded by the regression model were the administrative and medical staffing arrangements in the practice expressed as full time equivalents, the number of appointments unbooked at the start of the working day (corrected for list size), and the Carstairs score of local deprivation. Patients' reports of non-urgent and urgent doctor availability were derived from separate questions, but patient responses showed a high degree of correlation between the two questions (Spearman rho 0.63, $p=0.007$). After taking statistical advice it was decided not to include them as potential independent variables influencing each other.

5 Discussion

Dissatisfaction with the arrangements for seeing a doctor has been investigated in 17 practices in West Lothian, Scotland. Using information collected from the practices themselves, and from the results of a patient survey conducted in these practices, a number of variables have been investigated as possible independent predictors of dissatisfaction with the arrangements for seeing a doctor. Patients' perceptions of doctor availability following an urgent or non-urgent consultation request, and the number of patients identified as 'extras' corrected for list size appear to be key

variables independently predicting patients' dissatisfaction with access arrangements. Indeed, the proportion of a practice's patients who report they can be seen within two days following a non-urgent consultation request accounted for 86% of the variation between practices in patients' dissatisfaction with consulting arrangements. This is an unusually high proportion of variance to be explained by a single variable, and suggests that patients' responses to the questions on dissatisfaction with consulting arrangements and non-urgent availability may be interacting in a confounding manner. It is not clear why this should have occurred: a number of possibilities might be considered. First, it may be of importance that the relevant questions on which these variables are based were adjacent in the questionnaire within in a section asking about the patients' views of 'the arrangements for seeing a doctor in [this] surgery'. Whilst this structure may have had advantages in focussing the patient's attention onto a particular issue, it may also have introduced a response bias in that patients expressing dissatisfaction with one element in the section in question may be more inclined to indicate dissatisfaction with other questions within that section (Bowling, 1995). Reordering the questions might this have reduced this confounding effect, and should be considered in future use of the same questionnaire. A further possibility is that these are indeed independent effects, and that dissatisfaction with consulting arrangements is largely explained by patients' perceptions of doctor availability in the non-urgent situation. This is a significant possibility since this is likely to be the normal experience of most patients – although not formally examined, it seems reasonable to suggest that the majority of patients will only have limited experience of requesting an urgent appointment. Evidence to support this suggestion is available in the literature from Fishbacher and Roberston (1986) who observed that only 14.2% (178 of 1256 consecutive appointment requests over a four week period) were for same day appointments. Finally, attention is drawn to the footnote on page 233 for a third possible confounder. It is important to note the limitations of regression modelling in relation to the size of sample available. In this case, data from only 17 practices was available, yet the model described incorporated up to eight variables (in the first level regression). Altman (1991 page 349) notes the problems of sample size in relation to the number of variables available for multiple regression modelling, and suggests that an approximation to the number of variables which might reasonably be included might be the square root of the sample size – in this case suggesting it would be reasonable to consider investigation of four variables. A related consideration is the assumptions that are made when undertaking

multiple regression modelling. These include the linearity of the relationship between dependant variables and the independence of the effects of each variable on the dependent variable. Reference has already been made to the potential confounding interactions between the variables in the present model. Finally, it would be desirable to assess the predictive capability of the model on a new, independent set of data, but this would require a further, large study, which is beyond the scope of the present work.

In this study, patients' perceptions of doctor availability following an urgent or non-urgent consultation request are themselves independently predicted by the size of the list in the practice to which they belong; perceptions of non-urgent availability are also predicted by appointment operation as measured by the number of patients classified as 'extras'. First and second-level regression models have thus been successfully constructed using variables identified and explored in the earlier part of this thesis to explain influences on patient dissatisfaction with practice consultation arrangements (Hypothesis 18). The contributions of the various elements of the model is summarised in Figure 18, although because of the provisos outlined in the preceding paragraph, this model should be considered only as an indicator for variables which might usefully be investigated in further work.

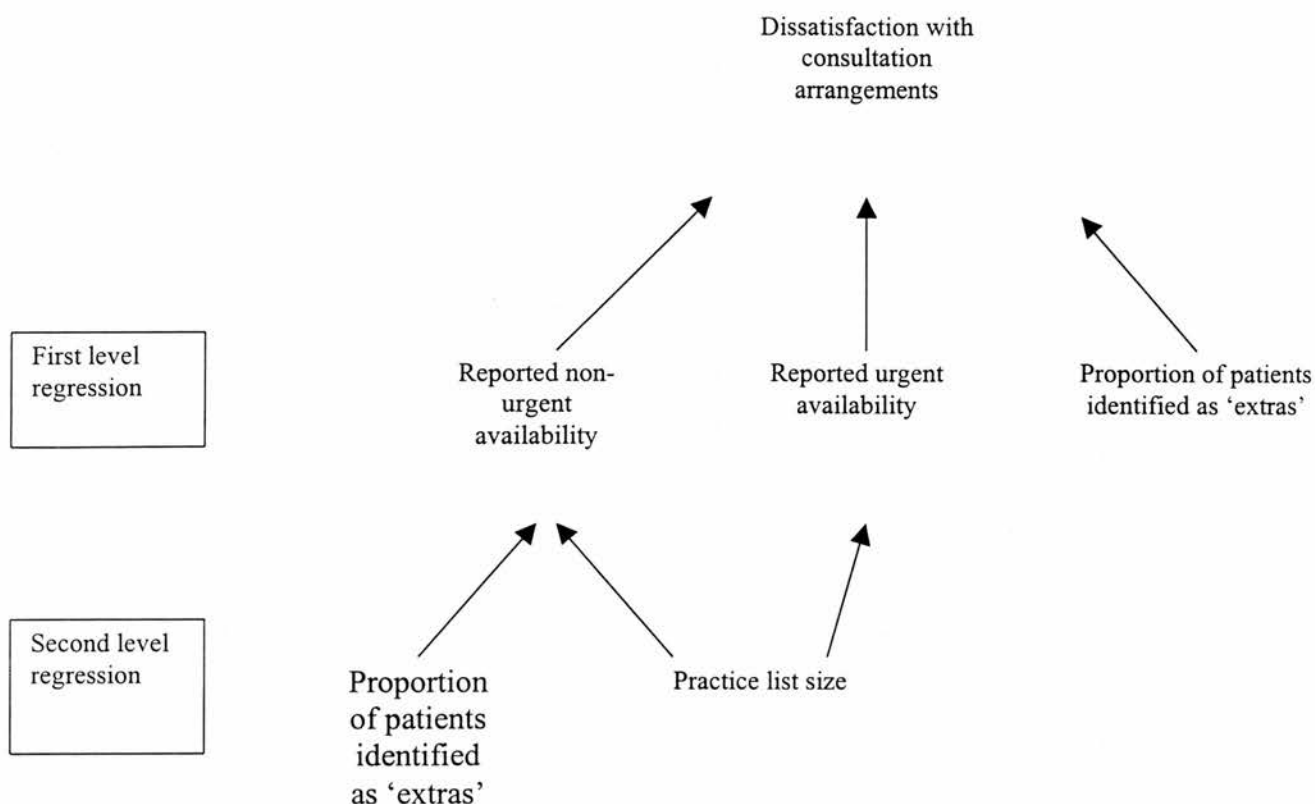


Figure 18 Summary model of patient dissatisfaction with consultation arrangements. (compare Table 35, page 232 and Table 36, page 234).

Patients seen as 'extras' had been defined at the start of the study as those patients seen at a consulting session who was considered additional to the number of patients normally seen or anticipated at that consulting session. The numbers of patients seen as 'extras' was an independent predictor of non-urgent doctor availability accounting for 61% of the variance between practices in the proportion of patients reporting their practice achieved the pre-defined target for non-urgent availability. In one study of such patients, Field (1987) identified that over half were children, that patients seen as 'extras' did not have higher than average consulting rates, and they did not include more men of working age or patients receiving certificates. The characteristics of patients seen as 'extras' was not explored in detail in this study, but there was a clear

negative association between patients' perceptions of availability and the number of patients identified as 'extras' by practices. On this basis it would seem reasonable to suggest that practices should move towards minimising the numbers of patients seen in this manner.

It is of note that practice list size is a key independent variable in this model. It is perhaps surprising that this should appear to be the case - as opposed to considering that practice list size might reflect the adequacy of medical or administrative staffing, or provision or availability of appointments. In the model presented, one should consider that list size is the most significant of the three variables relating to practice size and staffing and hence is entered into the regression at the expense of the other two variables (see footnote 17, page 233), although both administrative and medical staffing would have achieved significance if practice list size had not been entered as a potentially significant independent predictor. It is of some interest that Baker and Streatfield's work (1995) (involving a questionnaire survey of 16,015 patients from 89 practices in the South Western Health Authority area) also identified the importance of practice list size in a multiple regression analysis of variables explaining variation between practices in patients' reports of doctor availability. In that work, practice list size accounted for 43% of the variation between practices in patients' satisfaction with doctor availability. It should be noted that the independent variable being examined in Baker and Streatfield's work was slightly different from the variable examined in this study which examined patients' dissatisfaction with consulting arrangements, and patients' perceptions of doctor availability. Other variables identified as being of relevance in explaining satisfaction with doctor availability in Baker and Streatfield's work included the availability of a personal list system where patients were able (or at least encouraged) to see the same doctor (explaining an additional 9% of the variance), and the average age of respondent explaining an additional 2% of the variance where older patients tended to be less satisfied with doctor availability. In this present work, personal list arrangements in the practices were not investigated – this should be considered a short-coming of this study, and further investigation should incorporate an assessment of such an arrangement as a variable of potential importance. In view of the magnitude of the contributions of the variables described by Baker, it is perhaps not surprising that no

correlation was observed between average age of respondents and satisfaction with consulting arrangements in the present study.

The effect of list size also appeared to be independent of the socio-economic profile of the questionnaire respondents, anticipated patient 'flow' as measured by appointment booking interval or anticipated waiting time, or workload (after all measures were aggregated to practice level). It seems improbable that patients are indeed so aware of the size of their practice, and it is perhaps more likely that other independent variable(s) not measured in this study but associated with practice list size (such as functionality of the primary care team, telephone accessibility for example) are contributing to this model of patient perceptions of access in a manner yet to be defined. In this regard, more detailed examination of telephone accessibility or receptionist operation might be of interest - two examples of important variables which might be considered as potential candidates influencing patients' perceptions of doctor availability.

Detailed analysis of information obtained from practices in West Lothian, Scotland has shed light on the relationships between patients' perceptions of, and dissatisfaction with, the way in which primary care services are provided. The use of Accident and Emergency services has been investigated, and some of the potential influences on the patients decision to self refer to A&E for care have been explored. Information was obtained from practices, from patients, and from the local A&E department in West Lothian. So far, analyses have been based on description and statistical analysis of the data obtained. The first study of the next chapter continues to explore information obtained in the West Lothian study, but employs new technology to investigate some of these relationships from a different perspective. The final study of this thesis exploited the same technology to consider a further factor contributing to the accessibility of general practitioners, namely the size of the catchment area in which they provide services.

Chapter IV

Geographical information systems as a tool for investigating the accessibility of primary care

1 Summary

- Mapping of health information has taken place for many years, but the development of geographical information system (GIS) technology has made the techniques more widely available for health services research. In an attempt to explore some potential applications of GIS technology, information obtained during the course of the West Lothian study (described previously) was subjected to analysis using GIS techniques. Geo-referencing of information was carried out through analysis of postcode data relating to practices and patients. This information was analysed using ARC/INFO GIS software in conjunction with the ORACLE relational database and 1991 census information.
- Specific techniques employed in this analysis included basic mapping of geo-referenced information, and production of spider maps, Thiessen polygons, buffers, and convex hulls to demonstrate some of the potential of this technology in the visualisation of complex datasets. Using these techniques, the impact of considering actual distances travelled to the local A&E department (road network distances), as opposed to using the more readily available straight line distances ('crow fly') was demonstrated. Similarly, GIS technology and locational modelling permitted a review of optimal distribution of general practitioner premises in West Lothian based on pre-defined criteria such as population distribution, or pre-existing patterns of service provision. Using GIS technology, it proved possible to highlight and locate patients reporting difficulties with access to general practitioner premises. Variations in patients' perceptions of distance is demonstrated through a comparison of perceived distance to general practice premises with actual distances travelled from the patient's home address.
- The software used provided insight into patterns of use of health services, and facilitated presentation of results in a manner and style that could not readily be achieved through the use of alternative approaches to data analysis. GIS technology manipulates spatially referenced information, in this case obtained through the use of postcodes. Mapping of polygons, and manipulation of census information aggregated to user-defined units are alternative means of data analysis to more traditional techniques, and provided fresh perspectives on research data.
- GIS technology is a powerful investigative tool which should be made widely available to health service researchers and planners. Its ease of interfacing with other datasets (such as the UK census data) is one of many potential areas where it might provide additional and useful insights into health service research and planning.

2 Introduction

A review of the literature relating to the accessibility of primary care identified an approach to the investigation involving the use of mapping methodologies. Some of these studies have been referred to previously (page 31). Classical work exists in this area (Drake, 1810)¹⁸, but one of the more recent studies in medical geography (from Aberdeen) (Richardson and Dingwall-Fordyce, 1968), examining a role for 'patient geography in general practice' used '42 sheets (one per practice) of tracing linen on which were marked the locations of 1000 patient addresses'. The dispersion of patients around practices was examined in relation to workload and a role for practice geography in informing 'current local discussions on future health-centre policy in Aberdeen' was proposed. Similar work followed, helping to define a role for medical geography as a discipline¹⁹ in its own right. 'Social Science and Medicine' has been one of a number of journals notable as a conduit for medical geography research output, although more recently the discipline has had a number of its own journals (such as 'The Journal of Health and Place', first published in 1995). The geography of health care has been considered (Kearns and Joseph, 1993) to embrace two broad categories of research: the spatial properties of health care delivery systems (incorporating geometric concepts of 'space' with quantifiable attributes and patterns), and the accessibility, utilisation and planning of health care services (which has tended to emphasise the interaction of 'space' with 'place', a concept taking into consideration the interaction of people with space - some have equated 'place' with 'social space').

For reasons previously outlined (page 23), service accessibility is a key factor in considering the best arrangements for the organisation of health care services. In this regard, Powell (1995) has described the 'task and promise' of medical geography as 'not to over-concentrate on or ignore the spatial perspective, but to take space seriously.' The challenge, Powell states, is for medical geography to make meaningful contributions to its parent discipline (geography) and also to persuade

¹⁸ in (Barrett, 1996; Barrett, 1996),

¹⁹ Gray et al helpfully identify the essential steps in the conversion of a professional group to a body of people who practise a discipline as relating to the 'development of knowledge, and expounding it in scientific terms using methods that the scientific community can recognise as objective. This means publishing it in .. a peer reviewed scientific journal of the subject. Secondly, a discipline is .. worthy of a university chair. Thirdly, citations of the work .. provide independent evidence of scientific value' (Pereira Gray, Wright et al. 1997; Pereira Gray, Wright et al. 1997). On all of these grounds, medical geography more than adequately fulfills the criteria for recognition as a discipline in its own right.

other disciplines of the efficacy of a geographical perspective.

The provision of health care in the United Kingdom has undergone many changes in recent years, the most recent substantial change being the separation of purchaser and provider functions and the creation of the internal market for health in April 1991²⁰. Increased importance has been placed on identifying present and future health needs of the population as a more market-based approach to health care has been adopted. Commissioning and purchasing authorities require a clear understanding of the health needs and behaviour of the population in order that they may procure the most appropriate services.

There is an inherently spatial component to many of these information needs, the significance of which remains to be fully recognised. In this respect, health needs assessment must involve not only volume of services required, but also their spatial distribution. To meet the information needs of the new NHS attitudes and organisational structures may require to change, but more powerful analytical tools must also be utilised. Amongst these, GIS, with their database and display functions allow for the integration of data from numerous sources and the performance of detailed analysis taking into consideration the location of the variables in question - whether patients, services, or social and economic variables which might be of relevance. As such, GIS would appear to lend itself to health related studies although to date this technology has been explored in only a limited way in the health arena (Lovett, Cadoux-Hudson, J. and Heywood, D. I.1992).

Early applications of GIS focused on epidemiological issues (Dunn, 1992; Glass, 1991; Matthews, 1991; Nicol, 1991) - the "distribution and determinants of health and disease in groups" (Sackett, Haynes et al. 1991); one author (Picheral, 1994) has identified the stages of operation in 'spatial epidemiology' as consisting of plotting location and distribution maps showing more or less unequal frequencies and varying gradients of disease, prior to the correlation of these results (and their

²⁰ The election (1 May 1997) of a new government administration in the UK is likely to result in changes in health care delivery the precise nature of which remain to be seen. A recent circular letter from the NHS Chief Executive in Leeds addresses the 'replacing of the internal market with new collaborative arrangements' and identifies a central place for securing the delivery of '*equal access to health services for all the population, on the basis of clinical need*' (Langridge, 1997). (Langridge, 1997)

statistical validation) with the geographical distribution of one or more variables considered to be risk factors within the same space. More recently GIS has been applied to the planning and management of health care services - applications ranging from the creation of health profiles (Bloemberg and Doornbass, Harts, J.1992; Kivell and Mason, Rideout1992; Curtis, 1989) to the location of service centres (Dowie, Koval et al. Harts, J et al1995; Clarke, 1992; Morgan, Foster et al1990) and route planning (such as in the administration of ambulance services (Cattini, 1997)).

The West Lothian studies described previously (page 171) investigated the self-referral of patients from practices in one health district in Scotland to the local A&E Department, but considered this within the wider context of examining the accessibility of local primary care services. Increasing awareness of the potential role of time and distance as factors potentially affecting the utilisation of services, and a recognition of the potential role of GIS technology in investigating accessibility had led to the inclusion of a spatial referencing component in each of the main datasets collected during the course of that study. In order to explore the potential benefits of GIS technology in this area of research interest, a detailed case study was performed using information from the previously described datasets (page 177 et seq) and employing GIS software and methods.

3 Research questions and hypotheses considered

Can GIS technology be used to provide useful additional insights in defining the accessibility of primary care using data obtained from the West Lothian studies? The design adopted in this study did not explore a specific hypothesis, but should be seen as development of a methodology (namely the use of GIS technology) to explore and test the feasibility of using mapping techniques in the definition of primary care accessibility. The exploration of the potential for the use of GIS systems in this context was undertaken using data made available from the West Lothian studies as a case study.

4 Methods

Four datasets from The West Lothian Study were used. The content and collection of these data have been described previously. Additional information was extracted from two other datasets obtained from the Department of Geography at the University of Edinburgh. In summary, available datasets were as follows:

Dataset	Description	Source
Practice Questionnaire Survey	5310 records from patients attending one of 18 participating practices during 1 week period in March 1993	A&E Study
A&E Questionnaire survey	456 patients records from patients attending A&E during 1 week period in March 1993	A&E Study
A&E computer dataset	Anonymised data from St Johns Hospital computerised A&E administration system over an 8 week period late February-early May 1993	A&E Study
Practice profiles	For all practices participating in patient questionnaire survey	A&E Study
1991 Census	West Lothian population figures and a range of other socio-demographic markers (e.g. car and home ownership, employment status) at postal sector and output area levels	Manchester Computer Centre
Roads	Roads in West Lothian, Scotland	University of Edinburgh Department of Geography
District and postal sector boundaries	Boundaries and postal sectors in West Lothian, Scotland	University of Edinburgh Department of Geography

4.1 Geographical Information System

A specialised geographical information system (ARC/INFO) was utilised as the major tool in this study. ARC/INFO is one of a number of GIS packages

commercially available. Other packages (such as GIMMS, or MapInfo) are available²¹, but this package was judged to be most suitable for the purposes proposed. Processing of non GIS datasets was carried out using the ORACLE database, and some of these computations and all of the accompanying maps were carried out by the department of Geography at the University of Edinburgh. Such software are specialised packages and optimising their potential application required the resources of colleagues from the Department of Geography. I was responsible for providing the datasets, interpreting these to non-medical colleagues, and overseeing and guiding the analyses and mapping undertaken. Demonstration of the potential of GIS involved utilising the basic querying and display facilities, and calculation of straight line and network distances. The first of these permits mapping of spatially referenced variables using extensive display facilities available within ARC/INFO. Less complicated packages may offer similar facilities, but MapInfo (for example) does not readily undertake two dimensional mapping of variables being compared. *Spider graphs* display lines connecting peripheral points to a central reference point and are useful for illustrating patterns of concentration and dispersion. Their production involved processing of information outside of ARC/INFO. *'Thiessen polygons'* enclose an area where all locations in the polygon are nearer to a defining point than to the defining point for any other polygon. *'Buffers'* are polygons created round an entity at a defined distance. For a point, the buffer will be a circle, but for other shapes (e.g. a line), the shape of the polygon is determined by the shape of the original entity. Such buffers, irregular in outline, are referred to as *'convex hulls'*.

The method used for calculation of straight line distances between practice and the A&E department at St Johns Hospital has been previously described (page 178). The procedure involved geo-referencing of postcode information obtained from one of the three main datasets - the allocation of Ordnance survey grid co-ordinates for the centroid of the postcode sector to each postcode. These grid co-ordinates were provided through postcode processing in the POSTZON file (also described previously (page 178). Applying Pythagorean theorem to these easting and northing co-ordinates permitted calculation of the distance between patients' home addresses and their registered practice. This was compared with the distance travelled if

²¹ Recently, a number of these packages have become available as desktop pc software costing under £500. This study was carried out using a main-frame version of ARC/INFO run within the University of Edinburgh Department of Geography.

patients registered with the practice closest to their home address.

Network distances are those distances which take into consideration the road network along which people must travel. In this study only information on major road networks was available (residential roads and streets were not available), but this was judged useful and satisfactory to demonstrate the potential of GIS in analysis. As this element of The West Lothian Study was undertaken not only to inform the research, but also to demonstrate the potential of GIS software, some of the analysis undertaken used only a few practices as illustrative examples.

The relationship between A&E attendance rates and deprivation was explored. Whilst 'the composition and calculation of a deprivation index is a matter of considerable debate and there is no general agreement on either the variables to be included or the method of deriving the score' (Carstairs and Morris, 1989), Jarman's Score of Underprivileged areas is a nationally recognised measure used by the Department of Health for the purposes of allocation of deprivation payments to practices. These scores would normally be available from government agencies, but at the time this study was undertaken Jarman scores for postcode sectors based on the 1991 census had not yet been produced. On this account, Jarman's index of underprivileged area was calculated for each of the postcode sectors in West Lothian. Advice was taken from statisticians at the Scottish Office Common Services Agency regarding the calculations carried out to derive the 1981 score, and similar calculations were performed using 1991 census data relating to the 23 postcode sectors for West Lothian to derive a 1991 Jarman score for West Lothian postal sectors.

As an extension to the case study, locational modelling (using LOCHWISP²²) was used to investigate ideal siting of a new general practice facility based on mathematical modelling of travel distance to provider facilities - in this case examining the relationship between current population distribution based on 1991 census information, and the present distribution of practices in West Lothian. Mathematical modelling of location involves knowledge and incorporation of

²² Loactional analysis software developed by Dr R Hodgart, University of Edinburgh, Department of Geography

underlying assumptions within the model. In the models presented, minimising average travel distance was the desired target, and population figures were weighted according to historical patterns of demand for A&E services (over the 8 week study period) - weighted populations thus incorporated an adjustment for demand on A&E services whilst adopting the goal of minimising travel time to practice locations.

5 Results

Successful geo-referencing was carried out on an average of 77% of postcodes obtained from either the practice questionnaire sample (georeferencing of 3931/5310 records, 74.1%), the A&E survey (374/456, 82.0%) or the A&E HOMER database (4255/5684, 74.8%).

ARC/INFO provided a means for mapping of the location of questionnaire respondents home postcodes within West Lothian. Map 1 highlights the clustering of respondents home postcodes round main population centres in West Lothian against the background of the West Lothian road network. Differential point colouring might have been used to highlight respondent's from different practices, and has been used in Map 2 to highlight varying distances of individual patients from St Johns Hospital using network distances between home postcodes and the A&E department. A similar but more generalised effect is evident in Map 3 where differential colouring highlights network distance to St Johns Hospital from all locations in West Lothian.

The distribution of doctors in West Lothian is displayed (for participating practices) in Map 4 where circles of varying radii have been used to provide a visual representation of the numbers of doctors at each practice location. Since plotting involves locating a specific point on the map, figures have been used within the circles to highlight a numeric identifier for practices (partnerships) sharing premises at a given location.

Overlaying maps of questionnaire respondents dispersion with buffers round practices representing various straight line distances between respondent postcode and practice (Map 5) visually highlights the fact that the majority of respondents live

within 1 km of a general medical practice. Overall, 63% of practice questionnaire respondents lived within 1 km straight line distance of their practice, 93% within 2km (equivalent figures for A&E respondents were 65% and 92% respectively). Similar procedures might be applied to the entire West Lothian population to highlight the dispersion of doctors and practices in relation to population distribution.

More sophisticated GIS techniques using construction of Thiessen polygons and spider graphs were employed to demonstrate that questionnaire respondents (and hence presumably, West Lothian patients) do not always choose to receive care from their closest practice. In comparison with the 63% of respondents living within 1 km of a practice (qv), only 56% (2207/3931) reported travelling less than 1 km to their registered practice. Map 6 shows the shape and distribution of Thiessen polygons around practices in West Lothian, and an immediate impression is evident of the difference in size of catchment area of practices insofar as these polygons relate to premises rather than practices.

Overlain spider graphs demonstrated the distances travelled to practice premises by some respondents who by-pass other practices en-route to their chosen service provider. Some appear to be receiving services from providers some considerable distance from their home address.

Respondents' perceptions of distances and travelling times from practices is demonstrated in Map 7 and Map 8 where patients' responses to questions regarding distances from practice premises has been considered (Map 7) in relation to the actual (straight line) distance travelled. From this Map it would appear that Surgery 2 has relatively good geographical accessibility when compared with the others illustrated; for this practice more patients report they live closer to the practice premises than actually do so when home-practice distance is considered. Surgeries 7 and 19 on the other hand have respondents who perceive they live further from the practice; investigation of these practices (apparently having patients with quite different perceptions of practice accessibility) might provide a useful starting point for an examination of factors influencing patients' perceptions of distance from practice and any changes in patient consulting pattern which might result from these

varying perceptions of distance. Summarised data used to construct this map is provided in Table 37.

Contour plotting (Map 8) highlights and locates pockets of perceived difficulty with general practice access for some patients (all of whom used private transport to attend the practice) who live relatively close to the practice but report travelling times of 30-45 minutes. Others living considerably further away from the premises report much shorter travelling times .

Distance	Surgery 2			Surgery 7			Surgery 18			Surgery 19		
	Perceived	Network	Straight line	Perceived	Network	Straight line	Perceived	Network	Straight line	Perceived	Network	Straight line
<1 mile	117	91	165	32	38	54	21	24	33	191	248	263
1-2 miles	85	70	99	34	33	22	21	17	17	77	25	10
2-5 miles	69	118	15	30	27	23	6	9	0	6	1	1
>5 miles	6	1	1	4	2	1		0	0		1	1
No response	3						2			1		
Total	280	280	280	100	100	100	50	50	50	275	275	275

Table 37 Patients reports of distance between home and practice compared with network and straight line distances.

Four illustrative practices from West Lothian. Compare Map 7.

5.1 Use of Accident and Emergency

GIS readily provides visual displays of the spatial distribution of users of A&E services, similar to the maps already described relating to practices. Exploitation of ARC/INFO's differential colouring or use of the extensive range of symbols would permit highlighting of specific patient features under investigation - distance from A&E, registered practice, employment status etc, etc. Having said this, Map 9 is provided as an example of an unsatisfactory representation of A&E respondents reported difficulties with access to their registered practice. Despite the use of hatched internal lines, it is difficult to distinguish between groups of responses, and in the central cluster of practices, it is very difficult to identify the practice to which the spider graph relates.

The use of distance buffers centred on A&E in Map 10 and Map 11 provides visual evidence of the distance decay effect (page 31) in the use of A&E. The map legend gives an indication of the size of this effect in relation to the straight line (Map 10) or network (Map 11) distance from A&E

Although it is evident that the majority of respondents live within 1 km of their nearest practice (Map 5), ready quantification of this observation necessitates presentation of aggregated data in figure or tabular form. Inspection of Table 38 confirms the impression obtained from the map, and highlights the similar proportions of patients from both the practice and the A&E questionnaire samples who live within equivalent

Distance (km)	Straight line (proportional) distance rings			Network distance rings		
	Census Population	A&E Patient population	Attendance rate* (n/000 pop)	Census Population	A&E Patient population	Attendance rate* (n/000 pop)
0-2	24759	812	32.8	8484	292	34.4
2-4	27278	763	28.0	27829	870	31.3
4-6	21457	562	26.2	18762	490	26.1
6-8	17623	405	23.0	22161	614	27.7
8-10	15540	355	22.8	13368	278	20.8
>10	36808	794	21.6	52860	1147	21.7

*over 8 week study period

Table 38 Comparison of Accident and Emergency attendance rates (n/000 population) by 2km distance bands from A&E using populations within network or straight line (proportional) distance bands as denominator. Compare Map 10 and Map 11

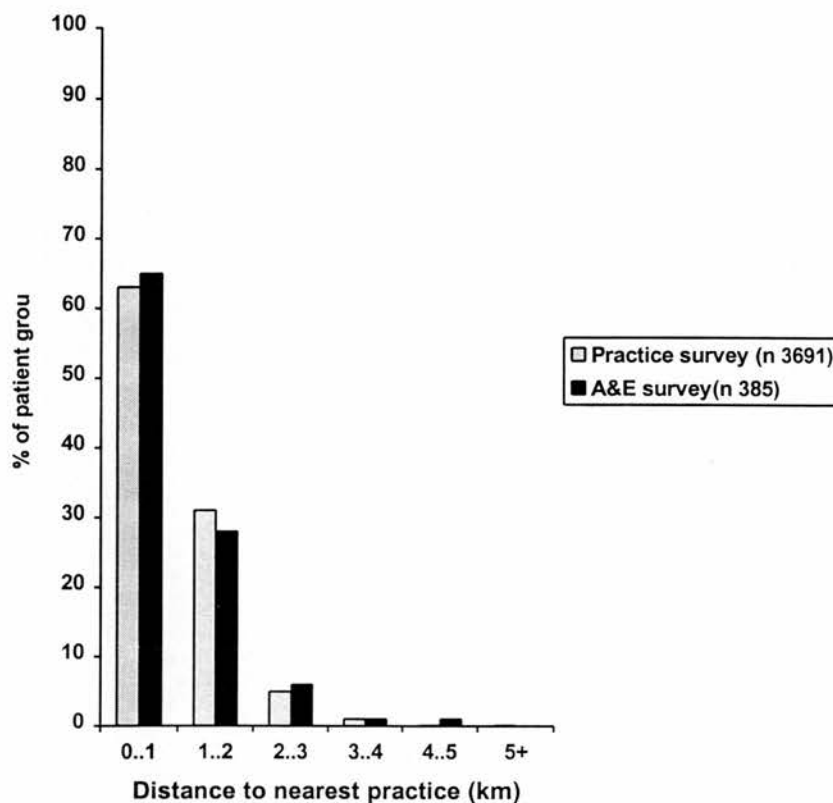


Figure 19 Proportions of West Lothian patients living within distance buffers around practices. Data based on geo-referencable patient postcodes obtained from A&E computerised dataset or from questionnaire survey of patients attending practices.

(straight line) distance bands of the West Lothian practices. Distance between home and practice would not appear to be a major factor in the decision to attend A&E.

5.2 Census

Incorporation of information from the census, and the ability of ARC/INFO to plot boundaries that were coterminous with boundaries used in the census permits visual representation of A&E attendance rates from populations defined by postcode sector. Map 12 maps the Jarman score for West Lothian postcode sectors, and appears to suggest an association between deprivation and A&E attendance rates. Use of a GIS thus facilitated investigation of A&E attendance rates using a nationally recognised

population base. The limitations of mapping as a means of analysis was recognised, and because of this, further investigation of A&E attendance rates using linear regression was undertaken to examine the relationship between unemployment, car and home ownership rates and A&E attendance rates and concluded that 'patients from less advantaged areas are more likely to use A&E than those from advantaged areas' - confirming the impression described previously although that statement was arrived at using the practice as the basis for investigation rather than the individual patient, or (as here) a geographically defined area.

5.3 Locational modelling

Locational modelling was used to compare the existing with ideal locations for practices on the basis of the spatial distribution of the West Lothian population using weighted output area census population information (Map 13). Existing facilities appeared to be close to ideal in location - perhaps not surprising in view of their situation in main population centres.

Potential locations for new practice premises were also investigated based on the objective of minimising the average distance travelled over the system. Map 14 demonstrates two possible locations for a theoretical new practice arrived at through either considering, or discounting the locations of pre-existing practices. This type of approach can take account of other factors judged to be of potential significance in influencing demand on services. In the model described, population measures were weighted according to historical patterns of A&E usage.

6 Discussion

Recent years have seen a burgeoning interest in the geographical and spatial aspects of the analysis of health care delivery. GIS technology has been identified as a potentially valuable adjunct in epidemiology (Lovett, Cadoux-Hudson, J. and Heywood, D. I. 1992) and in the spatial analysis of health care utilisation. A detailed case study was carried out exploring the potential of GIS technology in helping to examine and define issues relating to the accessibility of primary care and Accident and Emergency services in West Lothian, Scotland. Previous studies have examined the spatial relationship of patients using both primary (Joseph and Bantock, 1982; Knox, 1979) and secondary (Joseph and Phillips, 1984) care services and emphasis has been placed on those factors which influence patients accessibility to health services. Accessibility can be judged in socio-organisational and geographical terms (Joseph and Phillips, 1984) with patterns of utilisation of health services generally being viewed as a manifestation of accessibility (Hayes, Kearns et al. 1990; Phillips, 1979). Utilisation of health services has been found to vary with such factors as distance (Ingram et al. 1978) and the age, sex and income of patients (Joseph and Poyner, 1982; Fiedler, 1981) (cf page 31).

6.1 Data collection

This study was undertaken with a view to exploring the accessibility of health services in a geographical area, and spatial referencing of datasets had been planned from the outset. However, detailed discussions with geography colleagues did not take place until data collection in the main study was underway. Because of this, details of information obtained or the precise wording of questions asked in the patient surveys (for example in relation to the breakdown of distance band in questions regarding patients' perception of practice accessibility) might have been modified in the light of specialist geography input at the planning stage.

6.2 Geo-referencing

The process of allocating Ordnance Survey grid references to practices and to St Johns Hospital using postcodes²³ had been readily achieved for all of these locations previously (end section 4.2 , page 178), and provided the means of examining the effects of distance between practice and A&E on practice self-referral rates to A&E. When applied to postcodes obtained from the much larger datasets acquired after interrogation of the A&E computer database, or from two questionnaire surveys totalling c.5800 patients (all postcodes being based on patient recall), an average of 77% of reported postcodes could be successfully matched to OS grid references. Although in use for 30 years, it is recognised that many people cannot accurately recall their postcode and this will probably account for a significant proportion of the shortfall in postcode geo-referencing. Inadequate processing of information by hospital reception staff or illegibility of patient handwriting are likely to have also contributed to the shortfall. Some postcodes which were known to be accurate could not be processed by the POSTZON file, raising questions regarding its reliability which were not explored further as part of this study.

Census information in Scotland (unlike England and Wales) is based on information aggregated to postcode sector level. Boundaries for postcode sectors in West Lothian had previously been digitised -transferred to electronic code representation, and this was of major benefit in the analysis and presentation of data.

²³ The postcode is an eight digit rubric (eg AANN XBB) subdivided into area(AA), district(NN), sector(X), and unit(BB) providing a common geographic base for statistical analysis of population information. 'It was initially introduced by the Royal Mail to assist the mechanised sorting of mail and is now well known to users of statistical information. On average, a unit postcode covers about 15 postal delivery points with a range of around one to 50 addresses. A postcode as used by the Royal Mail does not represent an area with defined boundaries, it is merely a delivery point grouped to reflect a postman's walk. Although unit postcodes build up hierarchically into larger areas, for example the postcode sector (covering around 2000 homes), such areas may bear little relationship to administrative or other recognised areas.' (extracted from 'The 1991 Census User's Guide' p 55 Ed Dale,A Marsh,C 1993 HMSO London)

6.3 Geographical Information System

This study was carried out using the facilities of ARC/INFO in conjunction with database and other software. It was not the intention to explore differences between available GIS software packages, but to try to obtain an overall view of ARC/INFO as representing a specialised, complex GIS with extensive facilities for querying and display of spatially referenced information.

These querying and display facilities have been used to produce a series of maps illustrating some of the potential of GIS. Maps should be considered as representing superimposed layers of information relating to the same geographical area. Clustering of cases is easily identifiable (as for example the clustering of questionnaire respondents in West Lothian) but superimposition of a further layer might display information accounting for the clustering (for example the naming and mapping of recognised population centres). Differential colouring of a range of symbols and the ability to plot information accurately and with high resolution of detail proved useful for the mapping of individual's locations, or in the plotting of distances on the (superimposed) road network. ARC/INFO's facility for mapping in two dimensions permitted exploration of service use (A&E attendance rates) in relation to other factors of potential interest (e.g. deprivation scores). Personal problems were encountered with the colour schemes used in some of the maps. Spider charts using a variety of colours at the same location have to be carefully constructed for a colour-blind colleague! (one of 8% of the male population (Spalding, 1992)). In addition, because colour is an essential feature of many of these maps, reproduction of charts is difficult (tone and hue is not readily reproduced in photocopying) and potentially expensive. Care also requires to be taken with the selection and size of fonts used in maps.

The interaction between ARC/INFO and database systems facilitated calculation of accurate road network distances between points in West Lothian. The procedure for calculating network distances was however complicated and time consuming, and may limit the usefulness of the technique.

GIS mapping procedures use data extracted from arrays (tables) of information. Given this, it is not surprising that similar information might be obtained from statistical analysis of raw data. Distance decay effects have been presented in a visually attractive and striking manner, but similar conclusions may be drawn (NHS Centre for Reviews and Dissemination and Nuffield Institute for Health, Ferguson, B., Rice, N., and Sykes, D.1996; Mckee et al. 1990) from tabular presentation of the data - since all of the information in a table is being presented in one format (as opposed to the mixing of graphical representation with a numeric key and scale as in the case of a map), some might prefer presentation in this less complicated manner.

Certain elements of this analysis were powerful and unique to GIS software. Construction of polygons around fixed points, and the ability of ARC/INFO to link directly to databases to perform calculations using newly constructed polygons as a basis for population analysis is an important feature of ARC/INFO. Thiessen polygons were constructed for practice premises, and in conjunction with spider graphs gave insight into the distances travelled by patients to attend practices, and portrayed the recognised fact (Phillips, 1979) that patients do not always choose to receive care from their nearest practice. Thiessen polygons were also used to reconstruct census population figures prior to producing distance decay maps relating to A&E attendance rates. The ability to reconfigure datasets on the basis of predetermined criteria (such as distance to a provider centre) is a powerful feature of GIS with many potential applications in health care planning.

The definition of optimal catchment (“trading”) areas around practices on the basis of distances between practices, and the mapping of home location of patients attending the practice during the one week survey period revealed the crow-fly distances travelled from home to practice and the dispersion of these patients around the practice. The numbers of patients for whom a general practitioner can adequately provide quality care has been the subject of recent research (Campbell, 1996; Groenewegen et al. 1992; Calnan and Butler, 1988; Butler and Calnan, 1987), but this study highlights geographical dispersion of patients as a further variable which might contribute to the quality-of-care equation.

Construction of Thiessen polygons gave valuable insight into practice coverage, and it would be of interest to compare these theoretical catchment areas with the actual catchment areas used by practices. A limiting factor in this case study was the failure to include practices on the West Lothian boundaries of adjacent Health districts. This study had focused on West Lothian practices and patients very specifically, and data relating to bordering health districts was not readily available without considerable additional work. Inclusion of neighbouring practices would have altered the shape of the Thiessen polygon for practices near the West Lothian boundary, and this should be borne in mind for any future studies examining optimal compared with actual general practice catchment areas.

6.4 Locational Modelling

LOCHWISP software was employed in conjunction with ARC/INFO to explore the potential for mathematical modelling to inform (theoretical) discussions on the optimum distribution of practices in West Lothian. Existing locations were discovered to be nearly ideal when taking account of the present population distribution. This software has been used previously within Lothian Region as an investigative tool for the planning of service delivery to patients with dementia (Clarke, 1992). In the present study, locational modelling proved to give insights into the siting of two new theoretical practice premises, and the incorporation of a population weighting taking account of the historical use of another service (A&E in this instance) is a technique with many potential applications. It should be recognised that LOCHWISP is not itself a GIS, but used as an adjunct would appear to provide a valuable extension of ARC/INFO's considerable capabilities and applications.

A detailed case study has been carried out exploring the potential role for GIS technology in defining the accessibility of primary care and Accident and Emergency services in West Lothian, Scotland.

The software used (ARC/INFO) provided insight into patterns of use of health services, and facilitated presentation of results in a manner and style that could not readily be achieved through the use of alternative approaches to data analysis. GIS technology manipulates spatially referenced information, in this case obtained

through the use of postcodes. Mapping of polygons, and manipulation of census information aggregated to user-defined units (for example in relation to practices, or distances from a location under investigation) are alternative means of data analysis, and provided fresh perspectives on research data. The application of specific capabilities of GIS technology to an extensive previously collected dataset has provided additional insights into, and further defined the accessibility of primary care and demonstrated some of the potential for the use of this technology in health services research.

GIS technology provides an alternative means of displaying spatially referenced information. Linkage with other software (such as database management or locational modelling software) extends its capabilities considerably, and permits complicated areal calculations to be carried out. Straight line distances may be calculated using non-GIS technology, but GIS permits calculation of network distances which take into consideration the actual (network) distances users of services must travel. Locational modelling was used to examine the theoretical optimal siting of new health service provider units taking account of population data weighted according to historical patterns of service use. This is a useful facility which should be made widely available to health service planners.

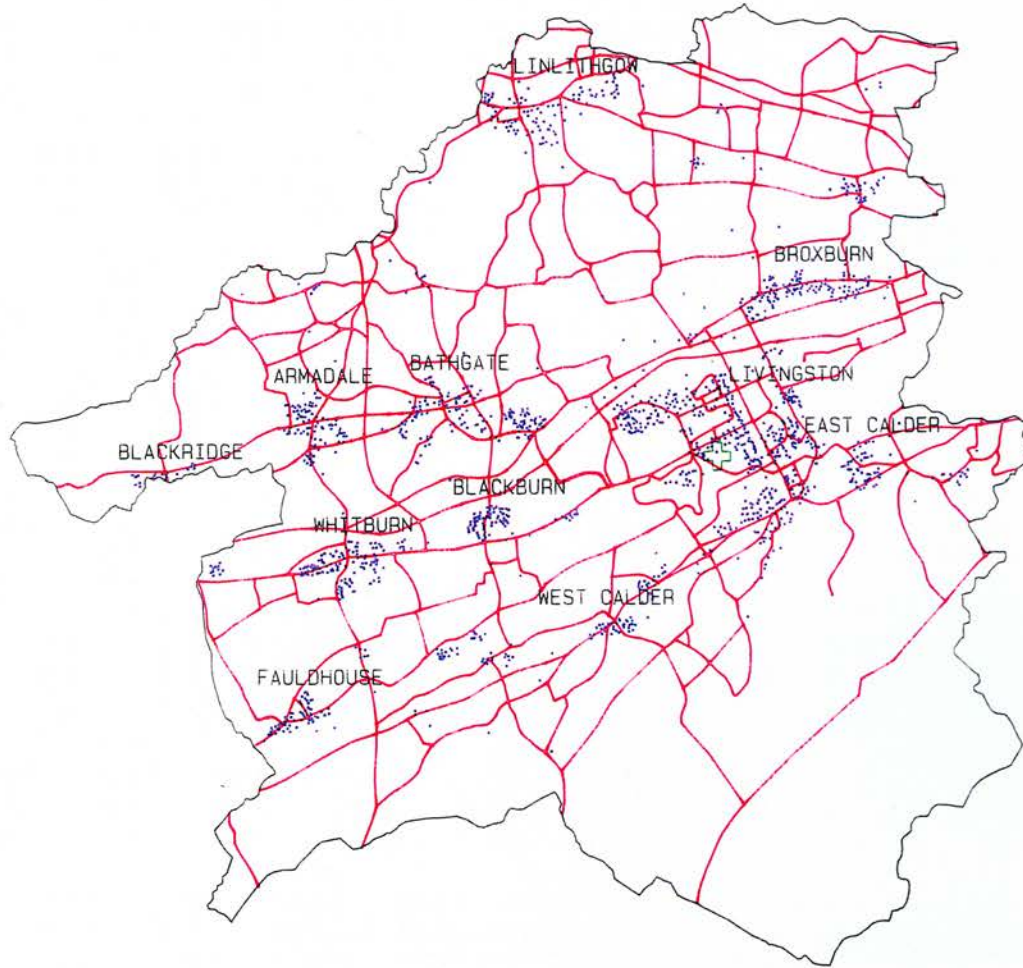
All of us live within a spatially constrained environment, and the appeal of geographers to "take space seriously" needs to be heard by health service planners, researchers, and providers. Room must be made, and resources should be provided to permit the incorporation of new technologies in the planning of health services for a new millennium.

This study used data collected during the West Lothian study to demonstrate some of the potential for the use of GIS technology in the field of primary care health services research. Convex hulls define measurable geographical areas, and provided the basis for undertaking the final study of this thesis investigating the size of practice catchment areas operated by general practitioners in the London Borough of Lambeth.




*Map 1 Distribution of West Lothian patients attending St Johns Accident and
Emergency Department. Main population centres and major road networks included.*

MAP NUMBER

DISTRIBUTION OF PATIENTS ATTENDING A & E



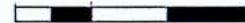
LEGEND

-  St. John's Hospital
-  A&E Patients
-  Major Roads

GRID
NORTH



2.0 0 km 4.0



MAP COMPILED BY LISA PARKER 1993

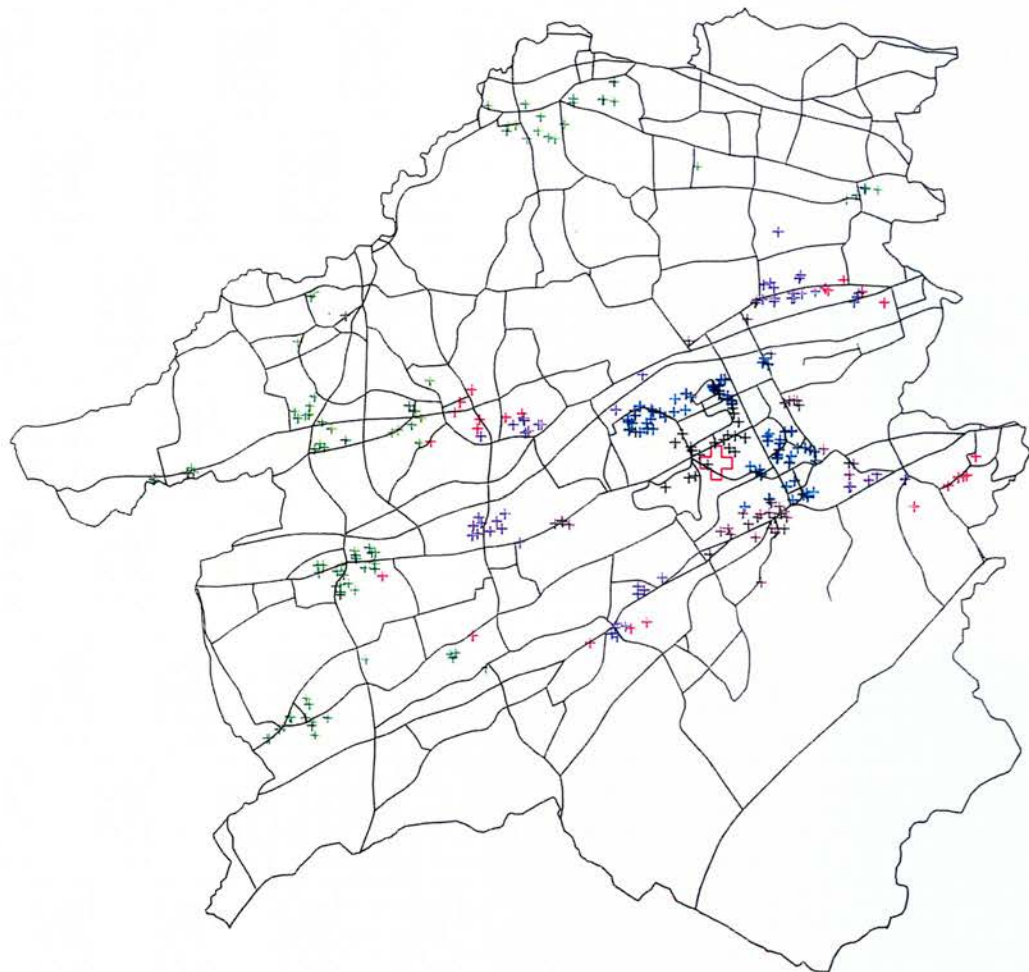
SOURCE: HOMER DATA

Map 2
A&E

Network distance travelled by questionnaire respondents attending

MAP NUMBER

NETWORK DISTANCE TRAVELLED BY A&E QUESTIONNAIRE
PATIENTS TO ST. JOHN'S HOSPITAL



LEGEND

Network Distance Travelled By
A&E Questionnaire Patients

- + Less than or equal to 2km
- + 2km to 4km
- + 4km to 6km
- + 6km to 8km
- + 8km to 10 km
- + Greater than 10km

GRID
NORTH



2.0 0 km 4.0

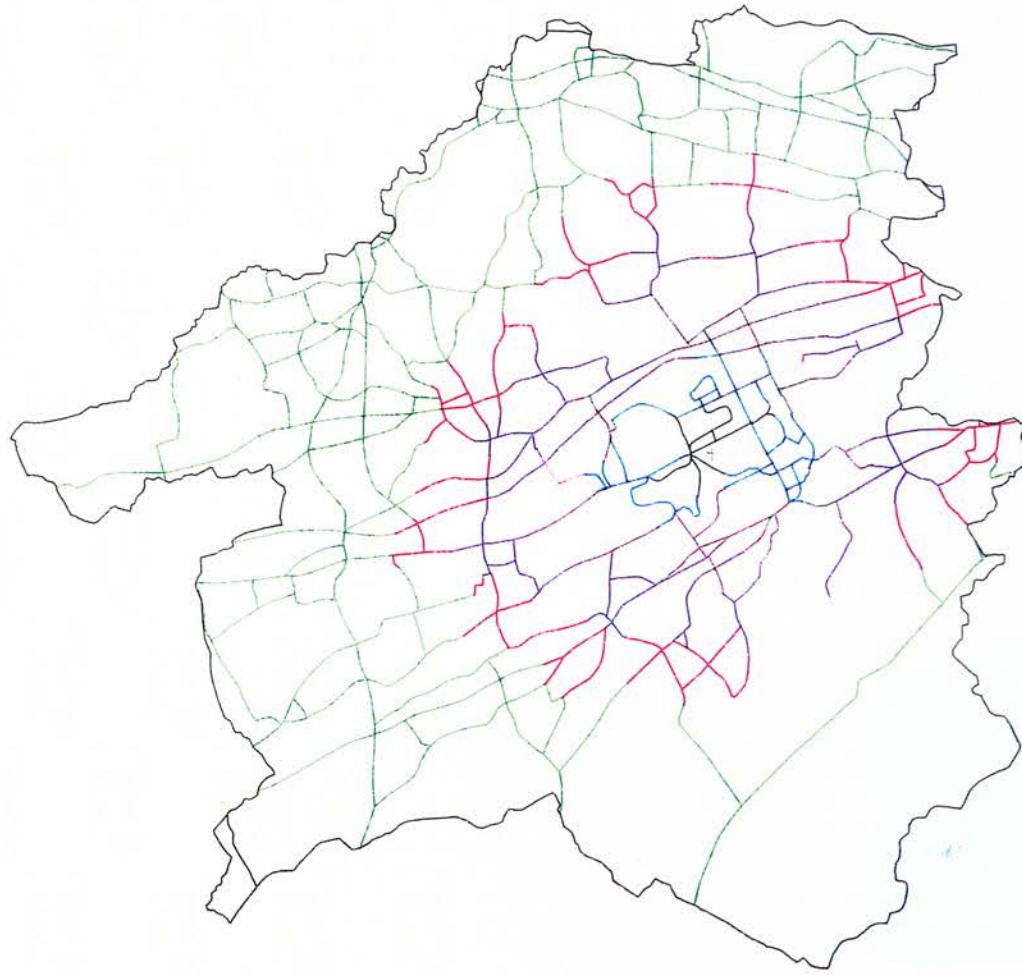


MAP COMPILED BY LISA PARKER 1993
SOURCE: A&E QUESTIONNAIRE

*Map 3 Network distances (major roads) from St Johns Hospital, Livingston,
West Lothian*




MAP NUMBER

NETWORK DISTANCES FROM ST. JOHN'S HOSPITAL

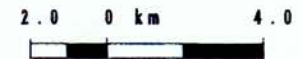


LEGEND

Network Distances

-  Less Than or Equal to 2km
-  2km - 4km
-  4km - 6km
-  6km - 8km
-  8km - 10km
-  Greater Than 10km

GRID
NORTH

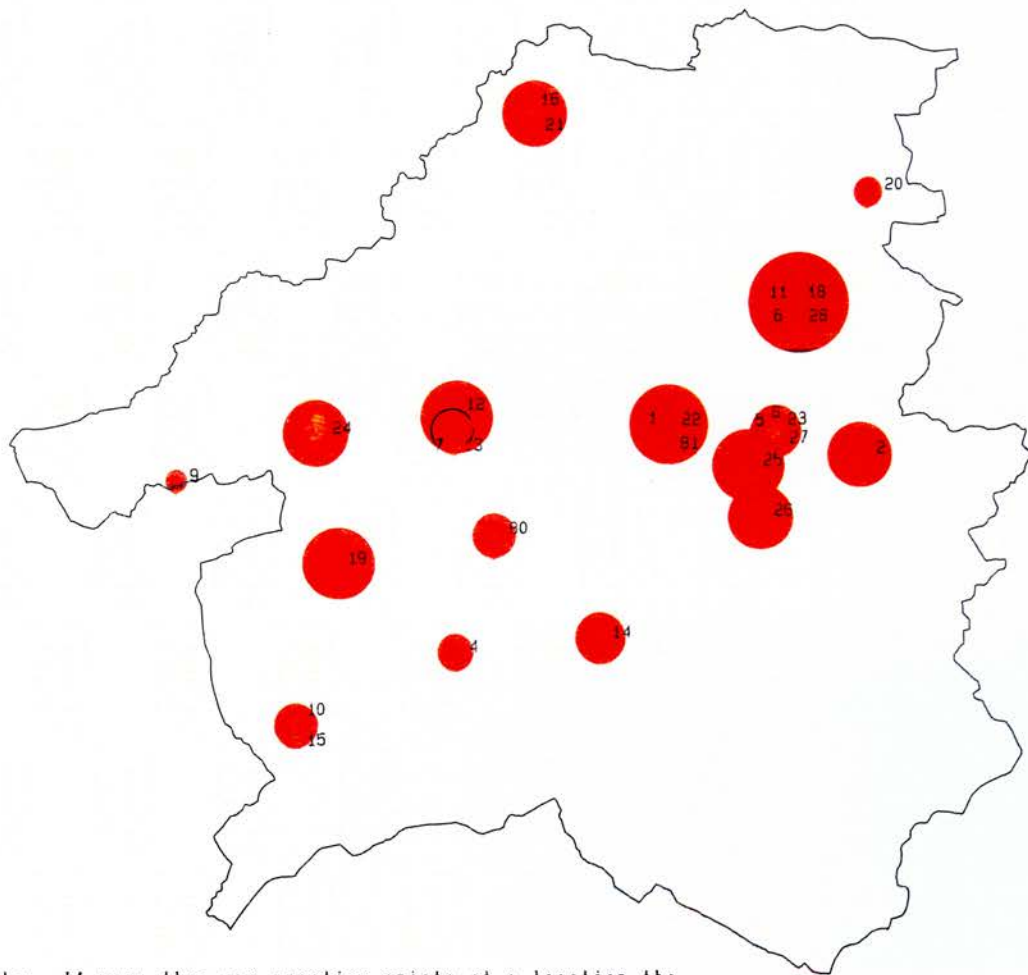


MAP COMPILED BY LISA PARKER 1993
SOURCE: Baribolomus

Map 4 *Numbers of doctors at each practice location. Internal figures represent identifiers for different practice partnerships sharing premises.*

MAP NUMBER

NUMBER OF DOCTORS AT EACH SURGERY LOCATION



LEGEND

Number of Doctors



GRID
NORTH



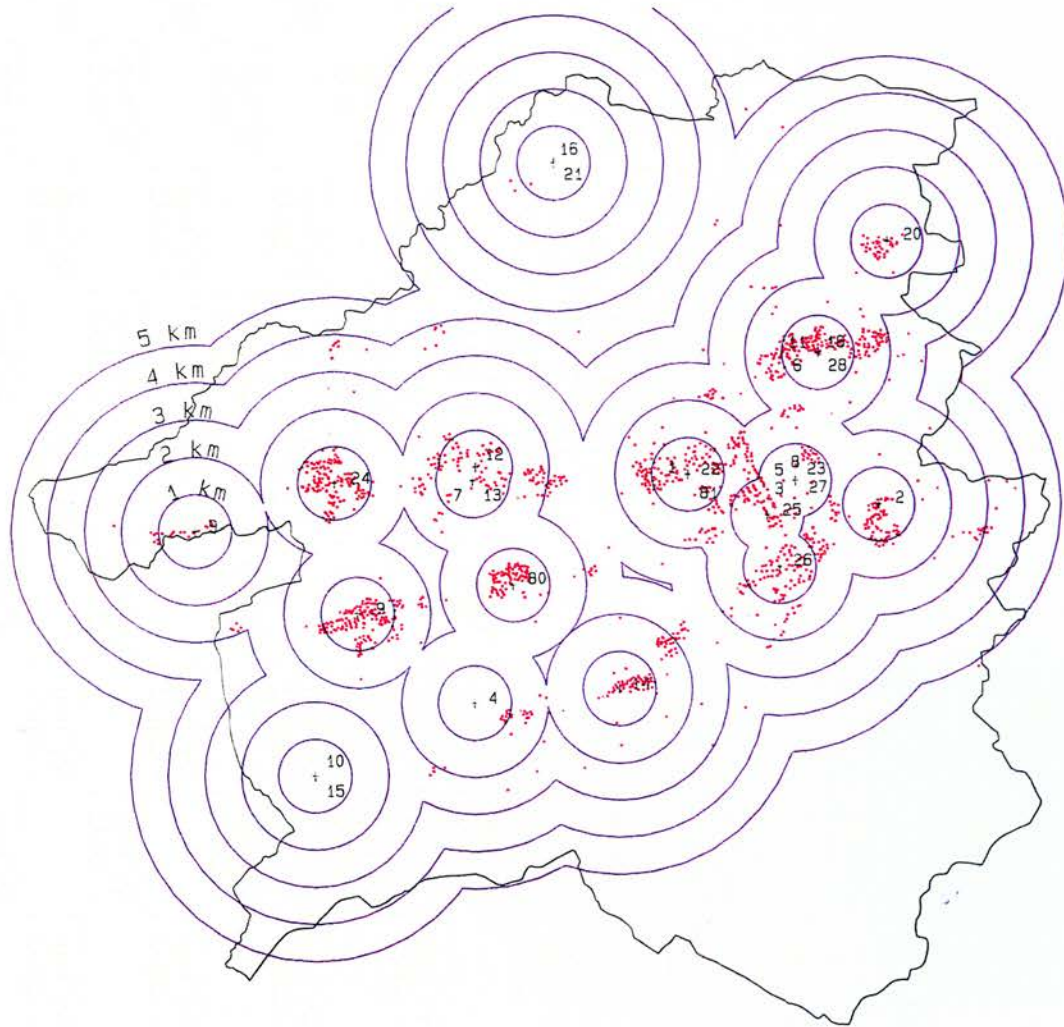
Note: If more than one practice exists at a location the circle represents an aggregation of all practices

MAP COMPILED BY LISA PARKER 1993
SOURCE: Dr. Campbell




Map 5 Straight line distance buffers (0-1,1-2,2-3,3-4,4-5 km) around West Lothian practices

MAP NUMBER

BUFFERS AROUND WEST LOTHIAN GP SURGERIES



LEGEND

-  Buffer Zones
-  GP Surgeries
-  GP Questionnaire Patients

GRID
NORTH



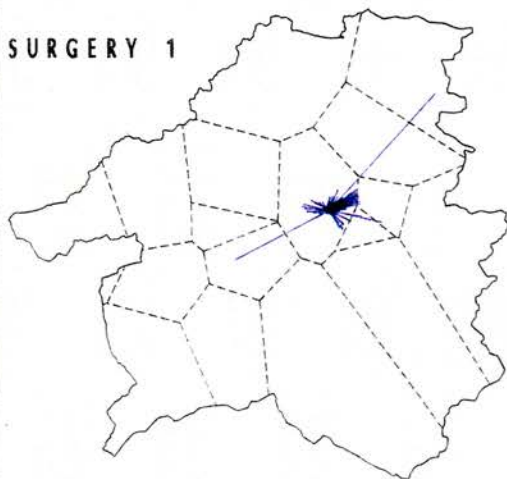
MAP COMPILED BY LISA PARKER 1993
SOURCE: PRACTICE DATA, GP QUESTIONNAIRES

Map 6 Spider graphs of patient home address in relation to the location of their registered practice from questionnaire respondents from four West Lothian practices selected as illustrative examples Hatched boundaries represent Thiessen polygons (see text) around premises.

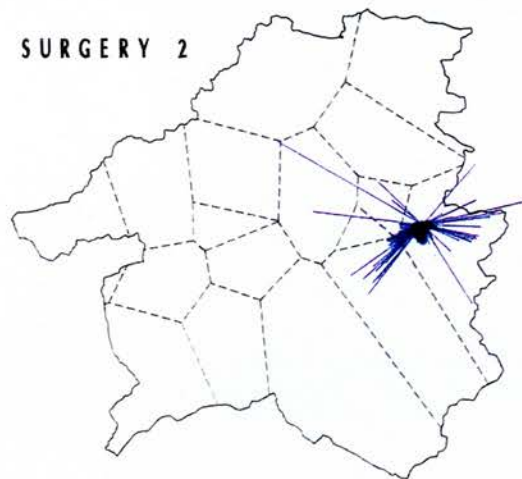
MAP NUMBER

PATIENT LOCATIONS FOR FOUR PARTICIPATING GENERAL PRACTITIONER SURGERIES IN WEST LoTHIAN

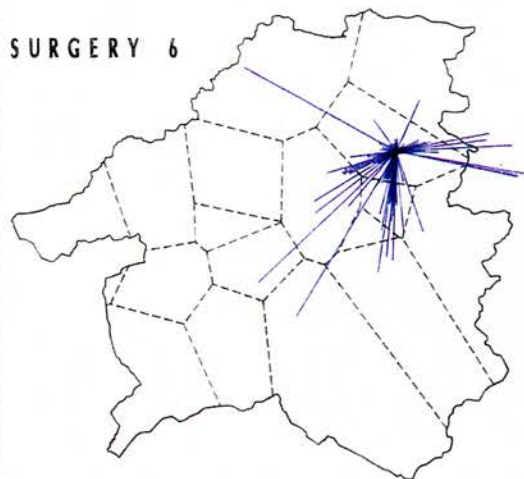
SURGERY 1



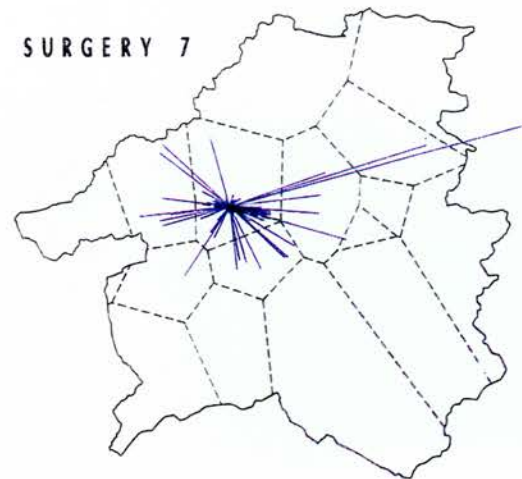
SURGERY 2





SURGERY 6



SURGERY 7



LEGEND

-  Straight Line Path to each Patient
-  Thiessen Polygons Around Each Surgery

GRID NORTH



6.0 0 km 12.0



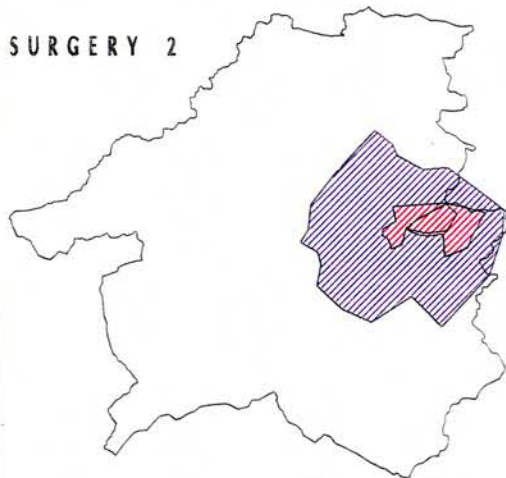
MAP COMPILED BY LISA PARKER 1993
SOURCE: GP PATIENT QUESTIONNAIRE

Map 7 Actual versus reported distance to four selected practices by network distance bands centred on practices (<1 mile, 1-2 miles, 2-5 miles). Reported distances obtained from questionnaire survey of patients attending practices; actual distances calculated from network distances between patient's home postcode and practice.

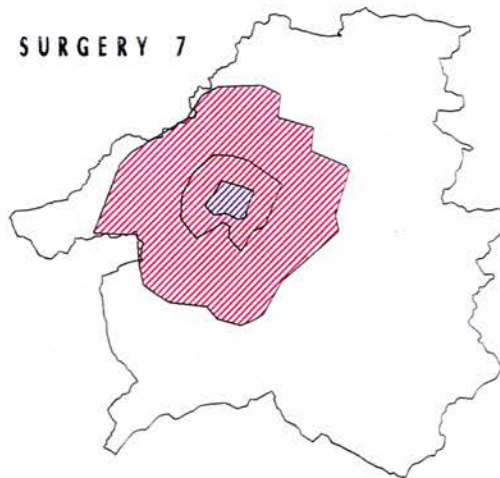
MAP NUMBER

ACTUAL VERSUS PERCEIVED DISTANCE TO SELECTED
SURGERIES BY NETWORK DISTANCE BANDS

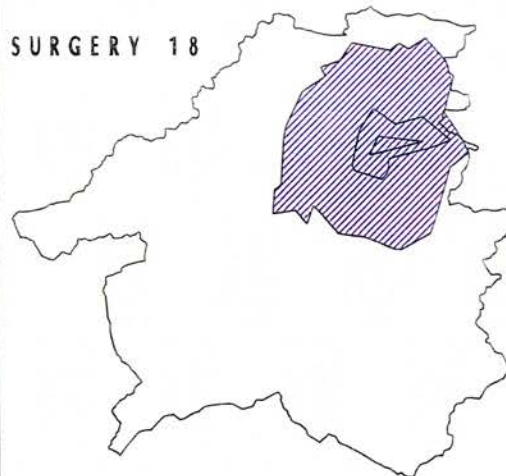
SURGERY 2



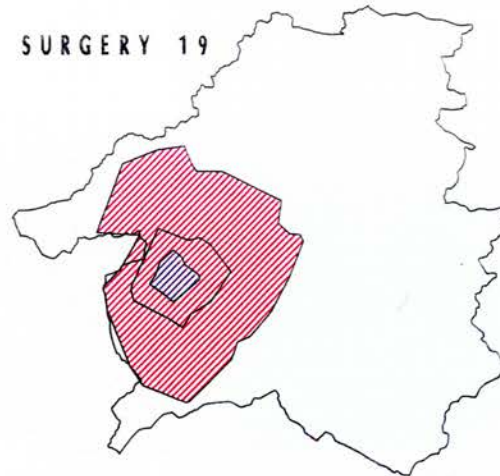
SURGERY 7



SURGERY 18



SURGERY 19



LEGEND



More Patients Perceive
they Live in an Area
than Actually do so



Fewer Patients Perceive
they Live in an Area
than Actually do so

GRID
NORTH



6.0 0 km 12.0

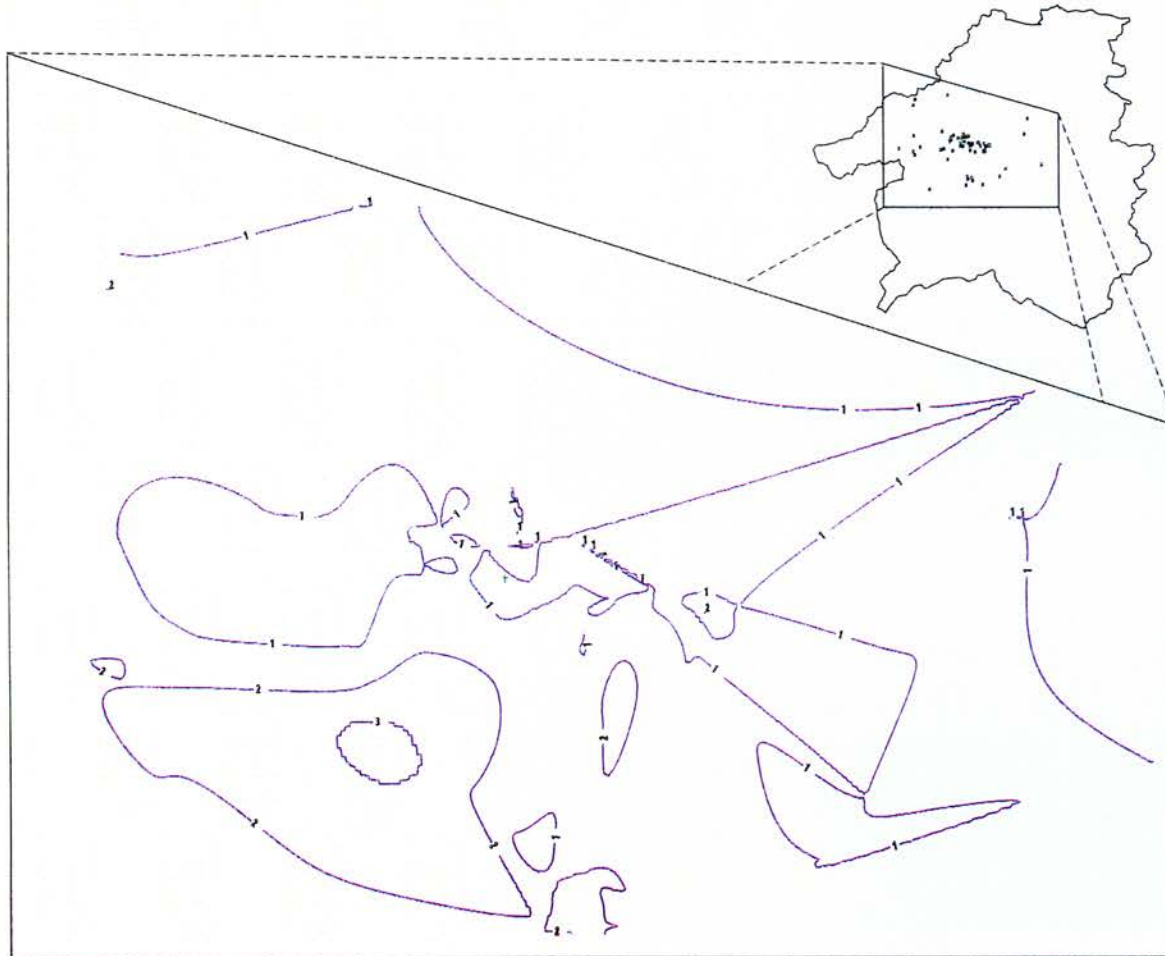


MAP COMPILED BY LISA PARKER 1993
SOURCE: GP PATIENT QUESTIONNAIRE

Map 8 Contour plotting of perceived travel time for patients using private transport to attend one practice (Surgery 7) during one week questionnaire survey.

MAP NUMBER SURGERY 7: PERCEIVED TRAVEL TIME CONTOURS
FOR PATIENTS WHO USED PRIVATE TRANSPORT

LOCATION OF PATIENTS
WITHIN WEST LOTHIAN



LEGEND

Contour Values

1 = Less than 15 Minutes


2 = 15 - 30 Minutes

3 = 30 - 45 Minutes

 GP Surgery

GRID
NORTH



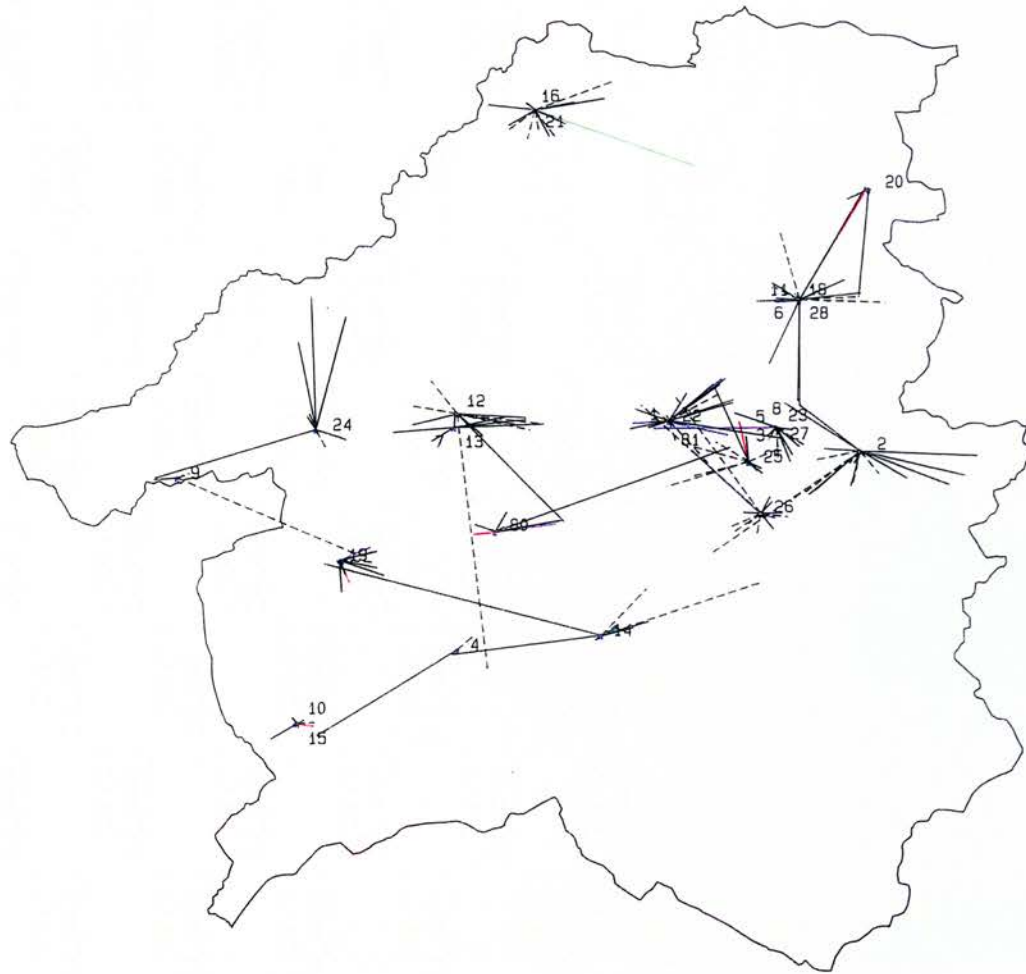
2.0 0 km 2.0


MAP COMPILED BY LISA PARKER 1993
SOURCE: GP QUESTIONNAIRE

Map 9 Spider graph map of A&E questionnaire respondents reports of ease of access to their registered practice.

MAP NUMBER

A & E QUESTIONNAIRE PATIENTS' PERCEIVED DIFFICULTY OF REACHING THEIR GP SURGERY



LEGEND

Perceived Difficulty

-  Very Difficult
-  Difficult
-  Neutral
-  Easy
-  Very Easy

GRID
NORTH

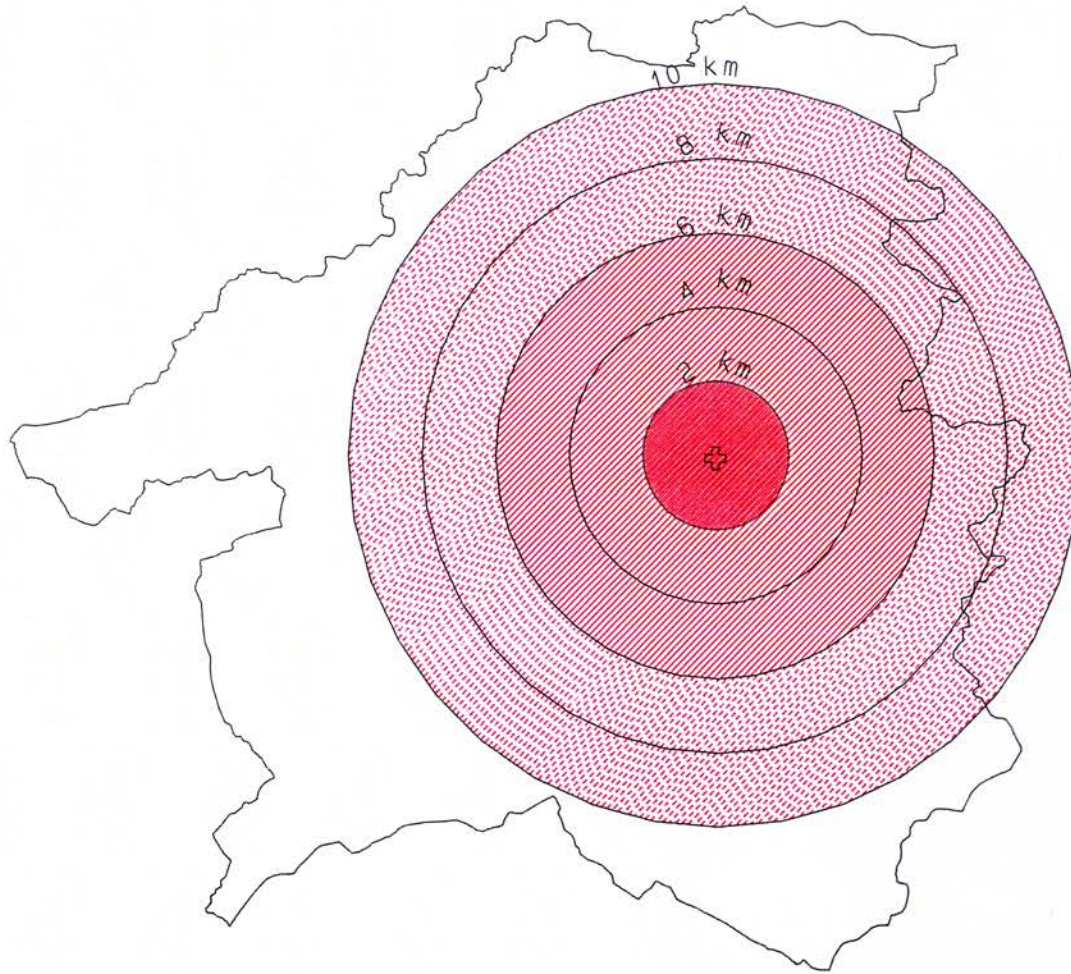


MAP COMPILED BY LISA PARKER 1993
SOURCE: GP QUESTIONNAIRS

Map 10 *All West Lothian patients attending A&E over 8 week study period as a percentage of 1991 census population in each of 5 straight line distance bands centred on St Johns Hospital (0-2,2-4,4-6,6-8,8-10km). Differential shading highlights distance decay effect in use of A&E services.*

MAP NUMBER

A&E PATIENTS AS A PERCENTAGE OF TOTAL 1991 POPULATION WITHIN 2KM DISTANCE BANDS FROM ST. JOHN'S HOSPITAL



LEGEND

Percentage Ranges

3.001 - 3.400

2.601 - 3.000

2.200 - 2.600

St. John's Hospital

GRID
NORTH



2.0 0 km 4.0

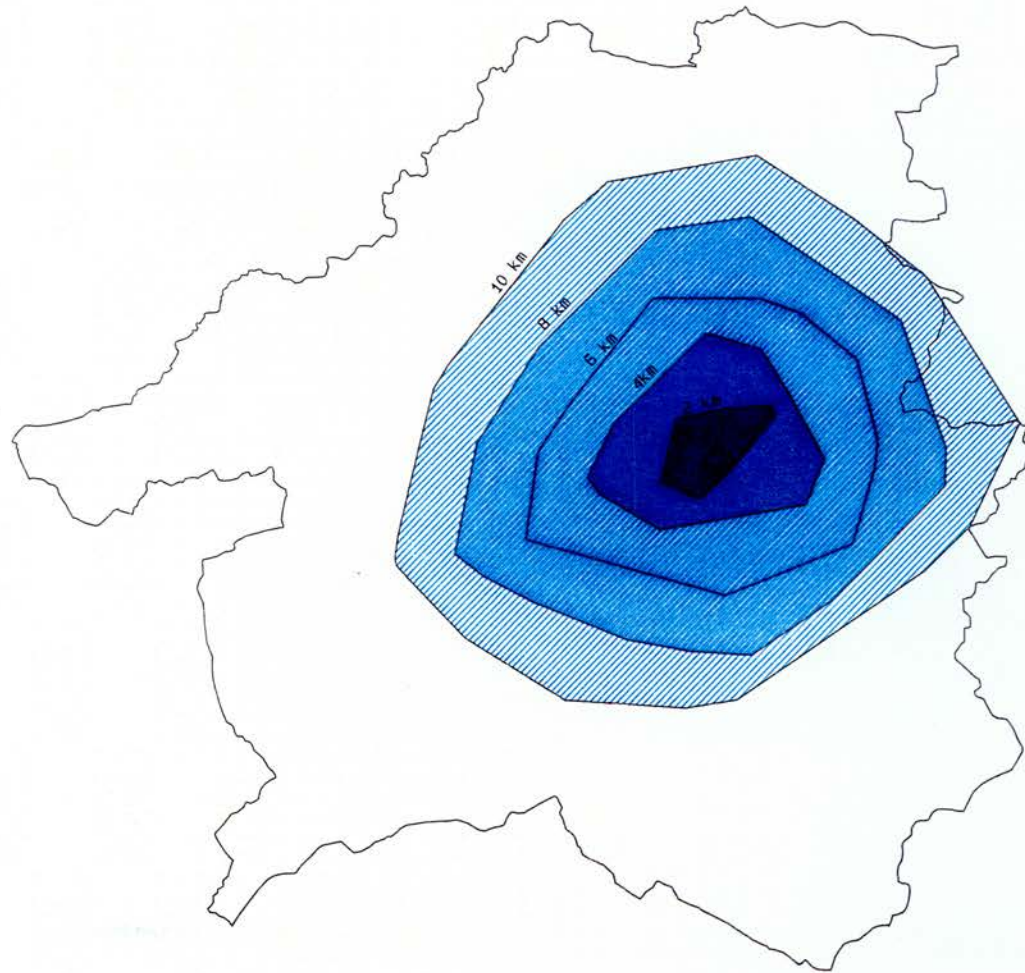


MAP COMPILED BY LISA PARKER 1993
SOURCE: 1991 CENSUS, ST. JOHN'S HONOR DATA

Map 11 All West Lothian patients attending A&E over 8 week study period as a percentage of 1991 census population in each of 5 network distance bands centred on St Johns Hospital (0-2,2-4,4-6,6-8,8-10km). Differential shading highlights distance decay effect in use of A&E services.

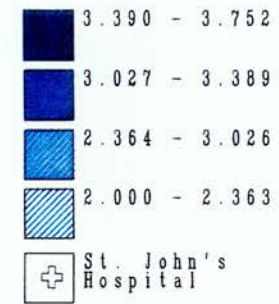
MAP NUMBER

A&E PATIENTS AS A PERCENTAGE OF TOTAL 1991 POPULATIONS WITHIN 2KM NETWORK DISTANCE BANDS

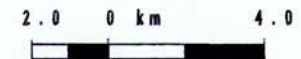


LEGEND

Percentage Ranges



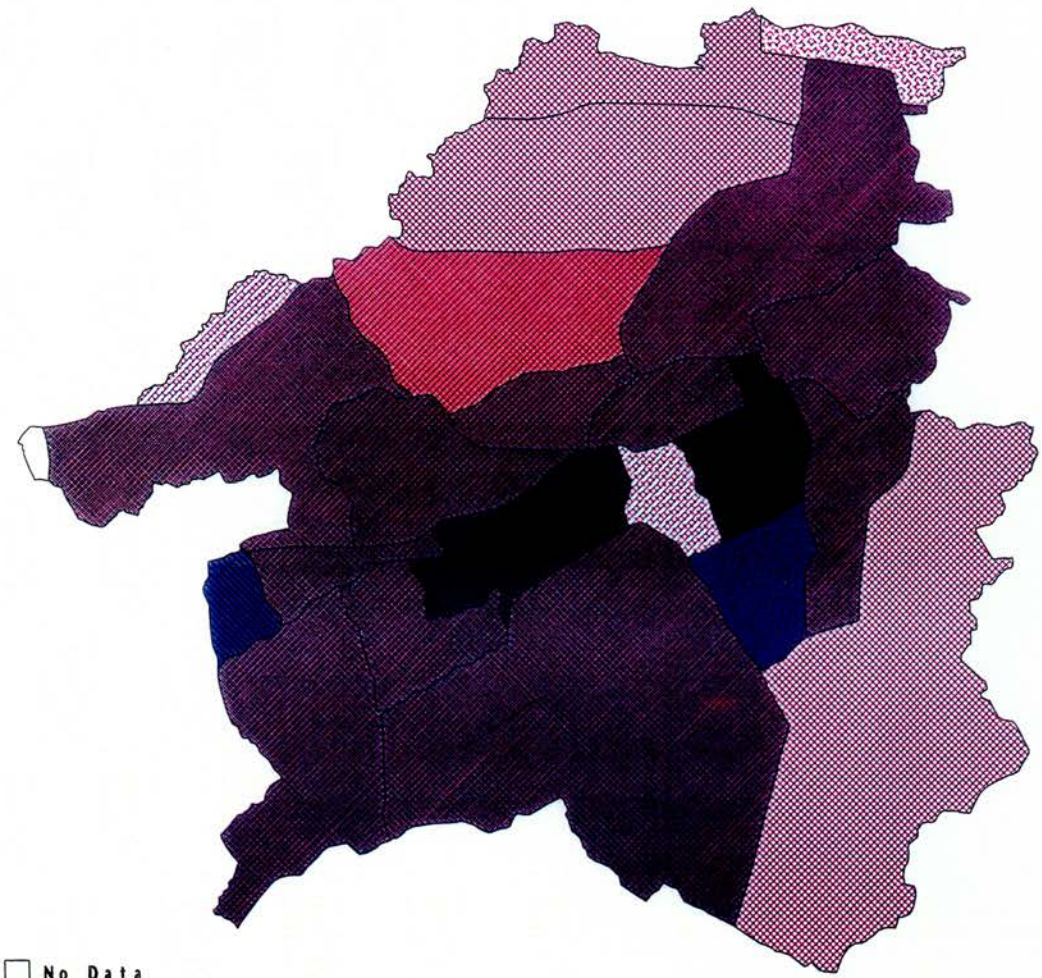
GRID
NORTH



MAP COMPILED BY LISA PARKER 1993
SOURCE: 1991 CENSUS, ST. JOHN'S HONOR DATA

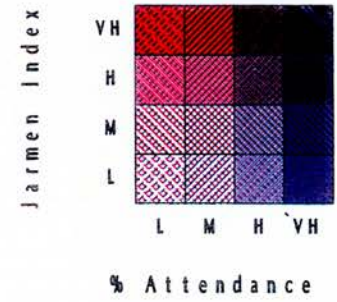
Map 12 Relationship between A&E attendance rates and 1991 Jarmen index scores for 23 postcode sectors of West Lothian.

MAP NUMBER ' RELATIONSHIP BETWEEN A&E ATTENDANCE AND 1991 JARMEN INDICIES BY POSTAL SECTOR IN WEST LOTHIAN

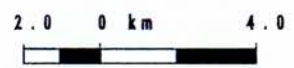


□ No Data

LEGEND



GRID NORTH

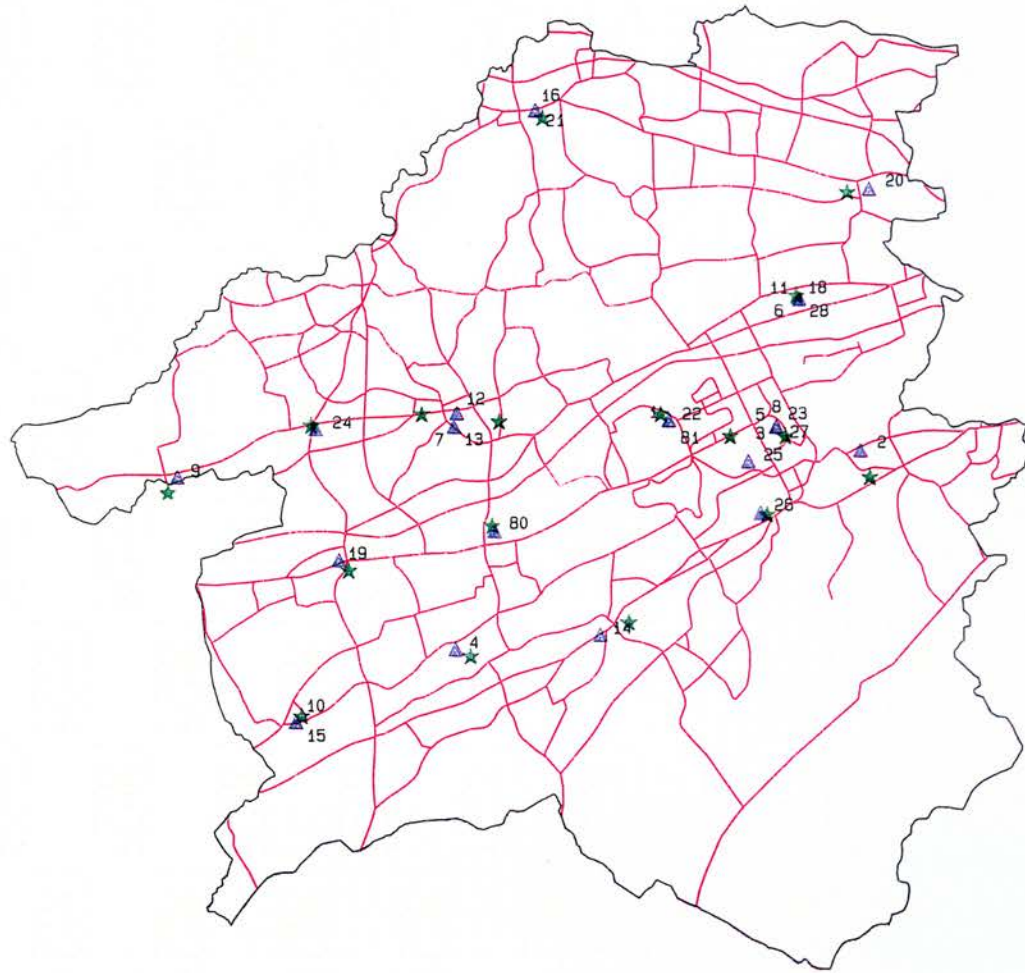


MAP COMPILED BY LISA PARKER 1993
SOURCE: 1991 CENSUS, ST. JOHN'S HONOR DATA


Map 13 Existing versus ideal locations of practice premises assuming same numbers of premises in West Lothian. Ideal location is based on minimising travel distance to practice premises for present population of West Lothian.

MAP NUMBER

EXISTING VERSUS IDEAL DISTRIBUTION OF GP SURGERIES



LEGEND

-  Existing Surgery Locations
-  Ideal Surgery Locations
-  Major Roads

GRID
NORTH



2.0 0 km 4.0



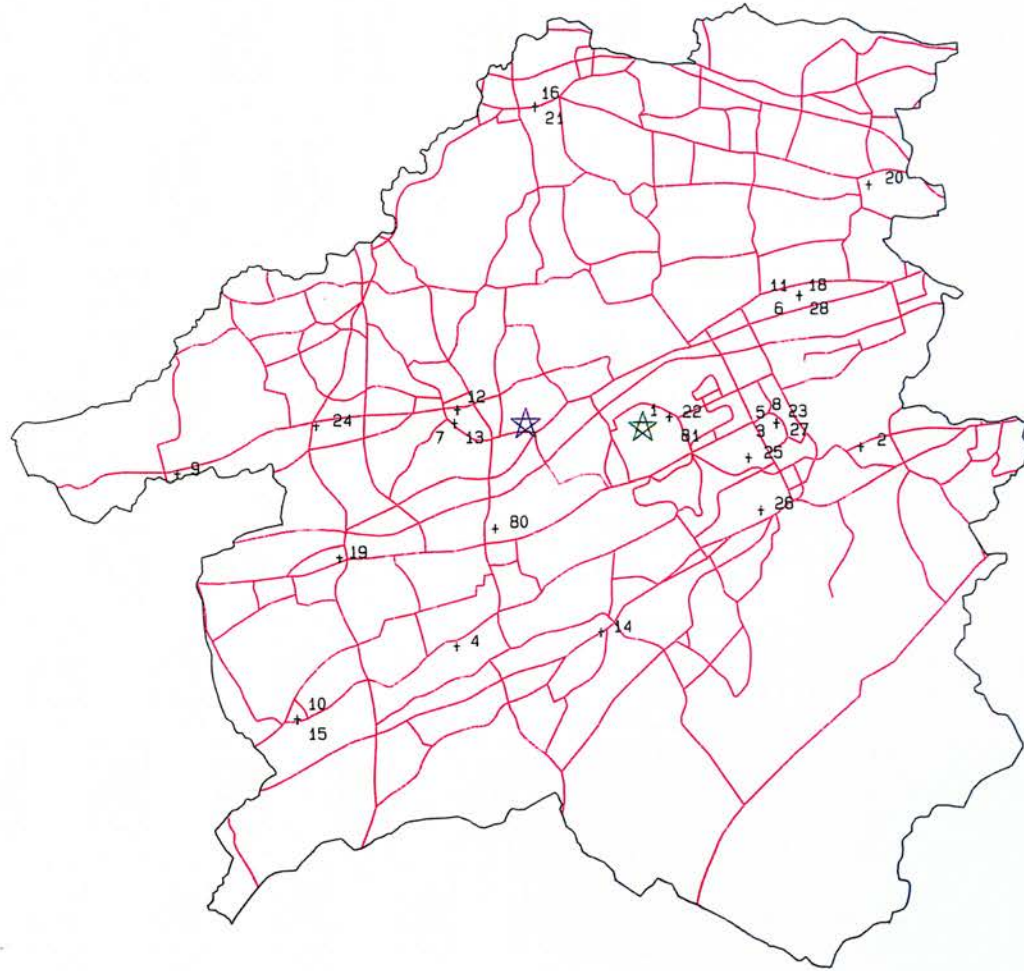
A horizontal scale bar with a black segment on the left and a white segment on the right, representing a distance of 4.0 km.

MAP COMPILED BY LISA PARKER 1993
SOURCE: PRACTICE DATA, LOCHRISP

Map 14 *Locational modelling for a (theoretical) new general practice facility either ignoring, or considering the location of existing facilities. Assumes minimising of distance to premises, and employs 1991 census population estimates weighted for historical use of A&E services.*

MAP NUMBER

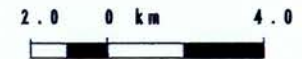
POTENTIAL LOCATIONS FOR ONE NEW FACILITY



LEGEND

-  Existing Surgery Locations
-  Best Location when Ignore Existing Facilities
-  Best Location when Consider Existing Facilities
-  Major Roads

GRID
NORTH



MAP COMPILED BY LISA PARKER 1993
SOURCE: PRACTICE DATA, LOCHWISP

***Catchment areas in general practice - a study in
the London Borough of Lambeth***

Catchment areas in general practice - a study in the London Borough of Lambeth

1 Summary

- Previous work has suggested that geographical information systems (GIS) technology may be a potentially useful tool in health services research. Whilst all general practitioners are required to define the catchment area in which they provide services, little research has explored the issue of the size and operation of general practitioner's catchment area. The size of the catchment area may be a factor influencing the accessibility of the general practitioner.
- This descriptive study examines the size of general practice catchment areas in one London Borough, and explores the relationship between catchment area size and a range of practice characteristics. All practices in Lambeth were invited to contribute to the study, and 60 out of 71 agreed to provide an up to date definition of the practice catchment area. Practice catchment areas were measured using GIS software after electronically plotting their outline on digital maps of the area. Information was obtained from the local health authority on a number of measures relating to practice characteristics and provision of services. Three variables (personal catchment area, practice personal list size, and practice patient dispersion) were calculated for each practice based on the newly measured catchment area.
- The average practice catchment area for study practices measured 2.42 sq miles with a 150 fold variation between the smallest (0.19 sq miles) and the largest (28.27 sq miles) catchment areas. Twenty four practices (40%) had catchment areas less than one square mile. Personal catchment area (practice catchment area divided by the number of whole time equivalents general practitioners in the practice) ranged from 0.09 sq miles to 28.27 sq miles with an average of 1.75 sq miles per whole time equivalent general practitioner. A 330 fold variation in patient dispersion was observed amongst the 60 participating practices from 102 to 33,686 patients per sq mile of practice catchment area. Weaker practices (as defined by a local quality measure) had average catchment areas more than three times the size of the stronger practices. An even larger variation was observed for personal catchment area sizes between the weaker compared with the stronger practices.
- In this study, weaker practices had relatively more deprived patients and larger catchment areas than stronger practices. Patients registered with weaker practices will therefore have greater distances to travel to receive medical care whilst also being more socially deprived than those from stronger practices. Optimal list size has not yet been defined, and the findings of this study suggest that practice catchment area as well as list size should be considered when planning delivery of primary medical care.

2 Introduction

The work described previously investigating the role of Geographical Information Systems (GIS) in the planning of primary care was developed further and applied in a study carried out in the South East of England. Reference has already been made to the use of Thiessen polygons and convex hulls defining measurable geographical areas, and it appeared that GIS techniques might be a useful way of examining the issue of general practice catchment area.

All general practitioners are required by their Terms of Service (Department of Health, 1989) to provide a map outlining the geographical boundaries of their practice area. This map, which is to be at a scale approved by the practice's local Family Health Services Authority, is to be reproduced on the practice leaflet. While the location of the practice is controlled to some extent by the Medical Practices Committee (see page 57) there is no such influence over the definition of the practice's catchment area boundaries. In health services research, the literature review has highlighted that most research interest has tended to focus on a range of administrative characteristics such as list size, partnership size, length of consultation and staffing and activities such as prescribing and referrals. Whilst there has been some interest in the geographical aspects of access to primary care, little attention has been paid to the issue of the size and operation of practice catchment areas. An exception in this regard is the work previously referred to examining patient geography in Aberdeen (Richardson et al. 1975; Richardson and Dingwall-Fordyce, 1968) which investigated patients' addresses in relation to distance from their general practitioner. Practice catchment areas however were not measured. At present, general practitioners may set their catchment area boundaries wherever they choose, with a lack of legislative constraints and a dearth of published research findings to guide their choice in this important aspect of practice planning.

The geographical area over which the general practitioner contracts to provide medical services is of importance to both the patient and the doctor. For the patient, accessibility of services is one of the major factors influencing their choice of practice (Billinghurst and Whitfield, 1993; Salisbury, 1989; Williamson, 1989) and use of general practitioner services (Haynes and Bentham, 1982; Parkin, 1979; Parkin, 1979). The

advantages of a patient being registered with a local general practitioner include reduced travelling time to the surgery, being within the area of responsibility of local care teams, and not losing out to 'more distant but mobile patients' (Robson, 1995). It seems reasonable to suggest that practices with large catchment areas may have patients who are located further away from the doctor, and for whom problems in relation to the accessibility of primary medical care might be of importance. However, some patients prefer to maintain links with a practice they have been registered with previously even though the distance to travel may be greater (Phillips, 1980). For the general practitioner, increased travelling time to attend home visits (Richardson et al. 1975) and the problems of co-ordinating their use of services and making referrals in areas distant from the practice may prove problematic.

3 Research questions and hypotheses considered

Having demonstrated some of its potential in a previous study, can GIS techniques be used practically in the investigation of general practice catchment areas?

'GIS technology can be used to define the size of general practice catchment areas'

• *Hypothesis 19*

What is the variation between practices in the London Borough of Lambeth in relation to the size of their catchment areas?

'General practice catchment areas vary with the list size of the practice, and (when corrected for list size) are relatively consistent across practices within an inner city area'

• *Hypothesis 20*

Previous work in this thesis has suggested that smaller practices (as defined by list size) may have advantages over larger practices in respect of the reported accessibility of care.

Is there any relationship between the size of practices' catchment areas and measures of the range and quality of services they provide?

'Practices with smaller catchment areas provide a more extensive range of higher quality services than practices with larger catchment areas'

•Hypothesis 21

4 Method

4.1 Geographical information system technology and the definition of practice catchment area

All practices in the London Borough of Lambeth (n=71) were invited to contribute to the study by submitting an up-to-date map of their catchment area boundaries. Non-responders were followed up by letter and telephone, or by visit to collect the information.

The catchment area boundaries were digitized (a straightforward but time-consuming process in which the catchment area outlines were transferred manually onto computer) and catchment area size calculated using the MapInfo geographical information system.²⁴ Most practices defined their boundaries by fixed physical structures such as roads, railways, or waterways - an example of a digitised practice catchment area map is provided in Figure 20. Practice location within the Borough was classified into three groups: northern, middle or southern, on the basis of postcode.

4.2 The variation between practices in the size of their catchment areas

Three new variables were calculated based on data relating to practice catchment area size, the number of whole time equivalent general practitioners working in the practice,

²⁴ MapInfo is PC based GIS software. ARCInfo, the software used in the previous study, is a more specialised package which at the time this study was undertaken was not available as a PC version.

and the number of registered patients. By dividing the total practice catchment area size by the number of whole time equivalent general practitioners in the practice, a measure of the geographical area nominally covered by each general practitioner (referred to here as the 'personal catchment area') was obtained. A variable called 'practice personal list size' was calculated by dividing the number of registered patients by the number of whole time equivalent general practitioners in the practice. A 'dispersion' measurement was calculated by dividing the number of patients registered in the practice by the catchment area size to give the number of patients registered per square mile of the practice's catchment area.

4.3 Range and quality of service provision

Further information regarding the practices was obtained from Lambeth, Southwark and Lewisham Family Health Services Authority regarding total list size, the number of partners and whole-time equivalents, the practice's banding status (a four-category variable attributed to each practice by the Family Health Services Authority after consideration of the range and quality of services offered by the practice, Table 41), fundholding status, the number of patients for whom the practice received any deprivation payment or a high deprivation payment, and the percentage of patients registering with the practice during the year as a measure of patient turnover. In addition, two prescribing measures - the percentage of all items generically prescribed and the Net Ingredient Cost of items prescribed per ASTRO-PU (Roberts and Harris, 1993) after excluding four high cost categories of drug²⁵ - were obtained. These data were analysed using SPSS for Windows (SPSS Inc, 1990), the Kruskal Wallis test being used generate a chi square statistic to compare variables in the four quality bands.

²⁵ Dornase alpha, growth hormone, post-transplant anti-rejection drugs, erythropoietin

5 Results

During the data collection phase of the study, six single-handed general practitioners retired and their practices closed. One general practitioner provided medical services for the residents of a nursing home, and did not operate a catchment area. Four practices, three of whom were classified as band A practices and one a band C practice, had ill-defined catchment areas for which they were unable to provide a detailed map. The remaining 60 practices provided detailed catchment area maps, and the data from these practices form the basis of this study.

5.1 GIS technology and the definition of and variation of practice catchment area size

The MapInfo GIS package proved straightforward to use. Practice size overall ranged from 0.19 sq miles to 28.27 sq miles with a mean of 2.42 sq miles, an almost 150-fold difference between the largest practice catchment area and the smallest. The practice with the largest catchment area appears to be an extreme value, being more than twice the size of the next largest practice catchment area. When this value was removed, mean catchment area size of the remaining 59 practices was 1.98 sq miles. However, even comparing the second largest practice with the smallest practice, there was still a 66-fold difference in catchment area size. Overall, 24 (40%) of the practices had a catchment area of less than one sq mile, 43 (72%) were less than two sq miles and 54 (90%) were less than five sq miles (Table 39).

Catchment area size (sq miles)	Number of practices
< 0.50	10
0.50-0.99	14
1.00-1.49	9
1.50-1.99	10
2.00-2.49	4
2.50-2.99	3
3.00-3.49	3
3.50-3.99	0
4.00-4.49	0
4.50-4.99	1
> 4.99	6

Table 39 Catchment area size (sq miles) for 60 general practices in Lambeth

There was some variation in mean catchment area size related to the location of the practice within the Borough. The mean catchment area size of the 22 practices in the north of the Borough was 1.45 sq miles, the 21 practices in the middle of the Borough had a mean catchment area of 2.31 sq miles, while the 17 practices in the south of the Borough had a mean catchment area size of 3.81 sq miles. When the practice with the extreme catchment area value was removed from this last group, the mean catchment area size of the southern practices was 2.28 sq miles. Variation in personal catchment area size according to geographical location was small - in the north of the Borough mean personal catchment area size was 1.12 sq miles, in the middle of the Borough it was 1.30 sq miles and in the south, 3.12 sq miles (1.54 sq miles when the extreme value was removed).

Five practices held fundholding status during 1995, of which four were classified by the

Family Health Services Authority as being in quality band D, and one in band B. Mean catchment area size of the five fundholding practices was 1.71 sq miles.

Personal catchment area size ranged from 0.09 sq miles per general practitioner to 28.27 sq miles with a mean of 1.75 sq miles, a 314-fold difference. Again, omitting the extreme value and using the next largest figure, there was still an 111-fold variation in this variable. Overall, 39 (65%) practices had personal catchment area sizes of less than one sq mile, 52 (87%) were less than 2 sq miles and 55 (92%) were less than 5 sq miles.

The number of patients registered with the practices ranged from 1,546 to 18,443, with a mean of 5,145. Practice personal list size ranged from 1,132 to 3,859 with a mean of 2,452. The number of patients per square mile ranged from 102 to 33,686 patients, with a mean of 5,445, representing a 330-fold variation in patient dispersion between the practices.

5.2 Practice catchment area size and range and quality of service provision

The 60 practices were unequally distributed amongst the four banding levels (Table 40), with 33 (55%) practices being in band D (the 'strongest' practices), 6 (10%) in band C, 13 (22%) in band B and 8 (13%) in band A (the 'weakest' practices). Substantial differences existed between the bands with regard to practice area, practice area corrected for medical staffing and patient numbers. A size gradient was clearly visible in terms of catchment area size, with practices in band A having average catchment areas more than 3 times as large as practices in band D. These differences were even more marked when personal catchment area size was considered, with practices in band A having personal catchment area sizes more than eight times as large on average than practices in band D. Mean practice personal list sizes varied less between the bands, but practices in band D had smaller personal lists on average than those in any of the three other bands. The measure of patient dispersion showed a marked gradient between bands, with patients in band A practices being more than four times more widely scattered geographically than those patients registered with practices classified in band D.

Deprivation payments were payable for more patients in band A practices on average than in any of the three other bands, although the figure for band D practices was only slightly lower. This was true both when the three deprivation payment levels were combined to give an overall percentage of the practice population eligible for deprivation payments, and also when the number of patients eligible for the highest level of payment were considered.

The proportion of prescription items prescribed generically was lowest on average in the band A practices, as was the Net Ingredient Cost per ASTRO-PU. The number of new patients registering with the practice during the previous calendar year as a proportion of the total list size showed a gradient between bands, with those in the 'weakest' practices registering proportionally fewer patients on average than those in any of the other bands.

6 Discussion

6.1 GIS technology and the definition of practice catchment area

GIS technology has been successfully used in this study to investigate the size of practice catchment areas in one London Borough. The study was based on the analysis of maps of catchment areas provided by the practices themselves. While the maps are likely to reflect current practice policy, in reality, a practice's patients may be more or less widely scattered than the map suggests. Clearly, in this study, methodological problems arise with the measurement of patient dispersion, as actual patient location may be unrelated to the calculated dispersion, but it does give an initial indication of the practice population density. It would be of interest to compare the results obtained from this study of catchment area maps with data relating to actual patient location as evidenced by practice or health authority postcode information (although bearing in mind that centralised registers of practice list information contain incorrect information for a significant number of patients(Majeed, 1995; Majeed, Cook et al. 1994)).

This study was carried out in an inner city area with high levels of deprivation using maps of practices' catchment areas. The utilisation of GIS technology to investigate

catchment areas is a new methodology, and as a result, it is not possible to comment on the relevance of the results to other geographical locations, whether these be in the inner city, or in urban or rural settings.

6.2 The variation between practices in the size of their catchment areas

This study did not consider the administrative and historical reasons why practices had chosen particular catchment area boundaries. While it is clear that some practices operated very small catchment areas from within which they were likely draw a high proportion of local residents, other practices had enormous catchment area boundaries where the patient population was likely to be widely scattered. Despite being located in an inner city setting where all practices were operating in a broadly similar environment, practice catchment area was observed to vary enormously amongst the 60 practices studied, even after correction for practice list size and medical staffing; the suggestion of Hypothesis 20 that practices operating in a similar setting might be ‘relatively consistent’ with regard to their catchment area size is therefore rejected. On the basis of the data provided, it is not possible to state with any certainty why these wide differences were observed. It is possible that ‘weaker’ practices may need to ‘cast the net’ wider as a result of financial constraints while ‘stronger’ practices could fulfil their capitation requirements by drawing their practice population from within a few streets of the practice premises. Catchment area size appeared to be related to both location within the Borough and to fundholding status, although the differences observed were not great. A further area for investigation might relate to the responsiveness of the practice to ethnic issues – anecdotally it is recognised that some Lambeth practices provide services to patients from specific ethnic groupings (for example through provision of ethnically sensitive services perhaps in a non-English language environment), and as such may attract patients from a wider catchment area than other practices. All of these factors would require to be considered in further investigative work examining the issue of general practice catchment areas in inner city areas, and in attempting to explain observed variations in this practice variable.

The issue of catchment areas in general practice, particularly in the inner city, is a

complex one with large numbers of practices providing their services over small geographical areas (London Health Planning Consortium, 1981). While it has been suggested that a rationalisation of catchment areas in general practice might be practical and cost effective, such a move is likely to compromise patient choice.

6.3 Practice catchment area size and quality of service provision

The development of performance indicators to measure certain aspects of practice activity is being undertaken by a number of Family Health Service Authorities (Majeed and Voss, 1995). The 'quality' banding measure we used in this study was set up in Lambeth, Southwark and Lewisham by the Family Health Services Authority in co-operation with the Local Medical Committee. Used to determine staffing budgets and as a management technique to improve the quality of services provided locally, the initial banding was based on questionnaire returns from each practice. Re-banding takes place on a continuous basis, using information gathered by Family Health Services Authority staff from the practice and using in-house data, such as those produced for target payments, and represents one local initiative in the use of performance indicators.

The literature relating to aspects of geographical location and accessibility of general practitioner services suggests that there is an 'inverse care law' effect in the location of surgery premises, these being less likely to be located in areas where need may be greatest (Knox, 1979)²⁶. Accessibility is also reported to decline at increasing distances from the surgery premises, a pattern known as the 'gravity model' or 'distance decay effect' (Haynes and Bentham, 1982). In this study, 'weaker' practices, who had higher levels of deprivation payments than 'stronger' practices, tended to have catchment area boundaries which covered larger geographical areas and a more widely dispersed practice population. It is likely, therefore, that patients registered in these practices are doubly disadvantaged by having greater distances to travel to a surgery providing a more limited range of poorer quality services, whilst also being more socially deprived than patients in other practices. The final hypothesis examined in this thesis (Hypothesis 21)

²⁶ Also see page 31

is therefore accepted - practices with smaller catchment areas in this study also provided a more extensive range of higher quality services than practices with larger catchment areas.

The magnitude of the differences reported here is surprising and, along with the inverse relationship described between quality of service provision and practice catchment area, suggests that it might be of importance for health service planners to re-examine the geographical distribution of general medical practices. Optimal practice list size has not yet been defined, although I have suggested previously that larger practice lists may be disadvantageous to patients. It would appear that larger practice catchment areas may also be associated with disadvantages to patient care, and it would appear that future developments in the organisation of primary medical care need to be informed by the results of further research in this neglected but important area of health care planning.

	Band A	Band B	Band C	Band D
Number of practices in band	8	13	6	33
Whole time equivalent GPs (wte)	1.00	1.23	1.47	3.07
	1.00	1.00	1.00	3.00
(*chi sq = 25.68, p < 0.0001)	1.00-1.00	1.00-2.00	1.00-3.80	1.00-7.60
Total registered patients	2775	2801	3585	6927
	2881	2876	3068	6088
(*chi sq = 24.13, p < 0.0001)	1821-3440	1546-3446	2501-6299	1793-18443
Catchment area size (sq miles)	5.48	2.69	2.39	1.58
	1.71	0.92	1.35	1.33
(*chi sq = 3.17, p = 0.37)	0.61-28.27	0.19-12.57	0.28-8.16	0.34-5.10
'Personal' catchment area (sq miles/wte)	5.48	2.07	2.29	0.62
	1.71	0.81	1.35	0.45
(*chi sq = 16.03, p = 0.0011)	0.61-28.27	0.19-9.99	0.21-8.16	0.09-2.27
Patient dispersion (patients per sq mile)	1668	3195	4609	7399
	1482	3212	2173	4334
(*chi sq = 13.31, p = 0.004)	102-4690	270-8010	341-14030	1142-33686
'Personal' list size (list/wte)	2775	2452	2812	2308
	2881	2523	2749	2266
(*chi sq = 5.45, p = 0.14)	1821-3440	1132-3446	1658-3859	1518-3442
% patients receiving deprivation payments	68.27	50.51	56.97	66.20
	88.74	46.27	51.28	71.78
(*chi sq = 3.75, p = 0.29)	6.59-95.47	2.57-95.02	26.15-95.58	6.97-98.82
% receiving high deprivation payments	9.88	1.51	2.33	6.49
	2.0	0.12	0.55	0.49
(*chi sq = 1.24, p = 0.75)	0.00-53.62	0.00-7.64	0.00-11.26	0.00-54.23
% items prescribed generically	51.54	53.10	56.85	55.96
	52.20	58.20	58.10	56.70
(*chi sq = 1.72, p = 0.63)	37.40-64.60	12.20-74.10	42.30-71.70	29.90-74.60
Net Ingredient Cost per ASTRO-PU - £ (excluding high cost items - see text)	15.06	17.29	17.55	17.95
	15.99	17.24	15.52	17.50
(*chi sq = 3.17, p = 0.37)	9.94-20.32	8.79-30.35	12.74-29.63	11.32-31.68
% patients registering in calendar year	6.14	10.35	13.27	14.20**
	6.84	10.34	14.83	11.87
(* **chi sq = 12.65, p = 0.0055)	0.00-12.71	5.39-14.29	4.99-17.08	0.00-58.35

* Kruskal Wallis test used to assess variation between the four 'quality' bands** data unavailable for one practice

Table 40 Practice characteristics and quality banding for 60 general practices in Lambeth.

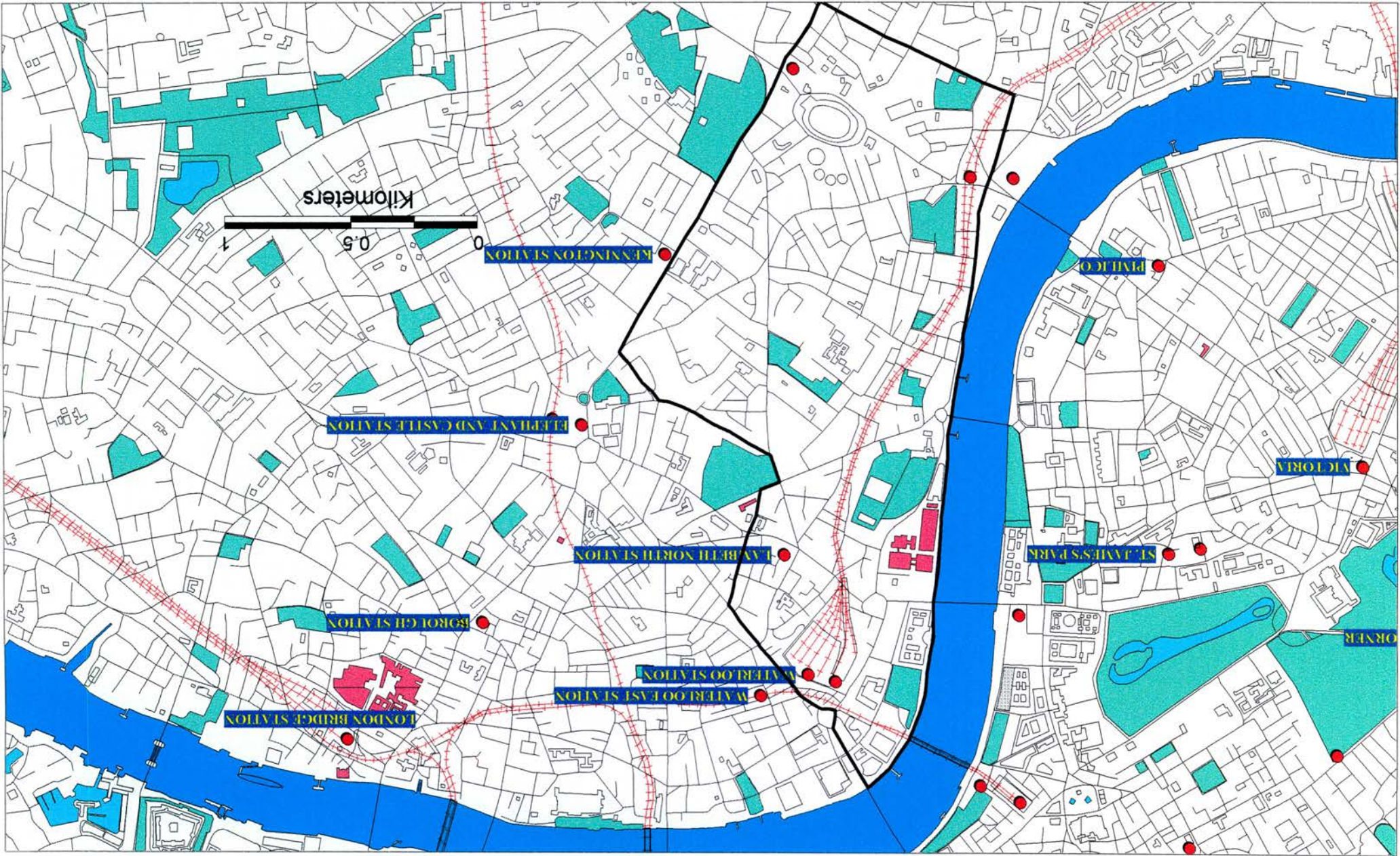
Average figures for practices in each band (median, range).

Band A - practices providing a basic service	Band B - practices providing a normal service	Band C - practices providing a full range of services	Band D - practices providing an extended range of services
Patient registration	All services provided by Band A practices	All services provided by practices in bands A and B	All services provided by practices in bands A, B and C
Appropriate personal general medical services to all registered patients	Ensure patients have access to child health surveillance services	Child health surveillance services	Health promotion band 3
Prescribing and system for repeat prescribing	Maternity medical services	Minor surgery	Practice-based complaints procedure
Arrangements for out-of-hours cover	Contraceptive services	Health promotion band 2	Staff development plans
Over 75 health check	Health promotion band 1	Achieve 50% target for cervical screening	Achieve 80% target for cervical screening
Fulfil availability requirements	Practice nurse	Achieve 70% target for vaccinations and immunisations	Achieve 90% target for vaccinations and immunisations
Approved premises	Partnership agreement	Partial computerisation	Service development plan
Suitable qualified staff, job descriptions and contracts		Health and Safety and COSHH	Needs assessment and service audit
Agreed practice area		Participation in audit	Written prescribing policy
Adequate medical record keeping		Regular team meetings	Teaching and training
Appropriate certification			Service innovation and development
Practice leaflet			
Participation in training			

Table 41 Services and quality indicators for practices in each band.

From (Lambeth Southwark and Lewisham Health Authority, 1995)

Figure 20 Digitised map outlining one practice catchment area in Lambeth, South London



Chapter V

Conclusion

1 Original Aims

This thesis has presented a body of original research relating to the accessibility of primary medical care in the setting of UK general medical practice. Specific research questions have been posed, and the resulting hypotheses have been examined in a series of five related studies. Central to the development of this work is the concept (repeated elsewhere in this thesis) that the appointment system is not just an organisational tool used for the administration of practice workload, but is a dynamic entity whose operation both influences and is subject to workload stresses placed upon it. In addressing these hypotheses then, it has been necessary to develop specific methodologies to examine the functioning of general practitioner appointment systems.

1.1 Out-of-hours care and general practitioner availability

The first study presented examined the relationship between out-of-hours workload and the risk of out-of-hours contacts occurring during the evening or at night. The risk was compared for out-of-hours sessions when appointments had, or had not been available for that day at midday of the preceding day. The study, carried out over a period of 31 weeks, demonstrated a 2.5 fold increased risk of out-of-hours contacts occurring for sessions following periods with reduced doctor availability (as measured by no available appointments at midday) compared with those sessions following periods of better doctor availability. Whilst some have suggested that variations in the operation of appointments systems are associated with detectable effects on doctors' stress (Howie et al. 1992; Chambers, 1991; Wilson et al. 1991), continuity of patient care (Freeman, 1989), and waiting times and consultation length (Heaney et al. 1991), and attempts have been made to explore patients' views on consulting arrangements (Noble, 1982), few studies have systematically recorded the effects of variations in appointment availability. Howie's work (Howie et al. 1992) for example examined doctor's stress in relation to

variations in the organisation of surgeries (using measures such as the percentage of consultations taking place in surgeries of less than 10 patients), but did not systematically record variations in doctor or appointment availability over time. No other studies have previously examined the relationship between variations in appointment availability and out-of-hours workload. Whilst statistical significance was not achieved for the study period adopted, the work has usefully informed the literature in providing evidence that a study period of approximately 300 consecutive days would be required to demonstrate the effect observed assuming a power of 80% at a 5% significance level.

The present study examined the relationship between two dichotomous variables relating the availability of appointments to the occurrence of out-of-hours contacts. A more powerful study design might have examined these as continuous variables – for example identifying the average length of time an individual might have to wait to receive a routine appointment on a given day, and relating this to the volume of out-of-hours work generated in the on-call period which followed. Such a study would have been considerably more difficult to conduct than the study design used here, and it is likely that recording bias would have been introduced through the extra workload which would be generated for research staff collecting the relevant information. Some of that bias might relate to the sampling frame used, with longer studies tending to be associated with data collector fatigue (Altman, 1991). It is not clear whether the potential disadvantages of the more complex study design described might be offset, at least to some extent, by the need for a shorter sampling frame, and this possibility should be considered in future work of a similar nature.

Although the study was conducted in a practice which was recognised as being atypical in respect of the numbers of doctors available for consultation, and in the unusually high teaching and research commitments of the medical staff in the practice, the out-of-hours workload generated was at a similar level to other reported studies of out-of-hours workload (Pitts and Whitby, 1990; Perry and Caine, 1990; Livingstone et al. 1989). A brief review of the findings of studies which have examined out-of-hours workload is presented in the context of the findings of this present work. A recent publication (Carlisle et al. 1998) from a research group in Nottingham has proposed that variations observed between practices and patient

populations in out-of-hours workload (and also in out-of-hours Accident and Emergency attendance rates) can be partly accounted for by variations in the socio-economic status of the populations being examined. This suggestion builds on similar work published previously by the same group (Carlisle et al. 1993) in which they examined variations in night visiting rates by general practitioners to patients located in 15 different wards represented by patients on the practice list. Out-of-hours workload might be considered to have determinants on the supply and demand side of the equation, and the Nottingham work relates to factors potentially influencing the demand side of the equation. In contrast, the presently reported work relates to the supply side of the out-of-hours workload equation, and considers that variations in appointment availability (and hence accessibility of medical services) might be a determinant contributing to the volume of out-of-hours workload. Whilst the out-of-hours study did not examine other potential influences which might have accounted for or contributed to the day-to-day variations observed in the the out-of-hours workload (for example by recording the postcode of patients generating out-of-hours contacts, or recording some measures of soci-economic status of such individuals), the present results suggests that future work examining potential influences on general practice out-of-hours workload should consider variations in general practitioner accessibility as a potentially important variable.

The undertaking of a study of out-of-hours workload in relation to daytime doctor accessibility gave an opportunity to examine variations in doctor behaviour in the management of out-of-hours contacts. The first area of investigation was in relation to the use of telephone advice as the primary means of managing out-of-hours contacts. Overall, 16% (198) out of 1202 contacts were managed with only telephone advice, although this figure concealed a wide variation (range 5%-27%) which occurred amongst five experienced doctors. 16% is a low rate of use of telephone advice when compared with other published studies, and with rates reported from the most recent models of out-of-hours care – general practitioner cooperatives, a study from London reported a telephone advice rate of nearly 60% (Salisbury, 1997a). The doctors contributing to the present study were atypical in a number of respects, and this may have accounted for the low rate of use of telephone advice. In particular, the doctors had substantial academic teaching and research commitments, and, having a smaller average personal list size than is evident elsewhere in Scotland, were less frequently

involved in covering out-of-hours work than other Scottish doctors. No published studies have previously examined the use of various management strategies for out-of-hours contacts in relation to the frequency of involvement in out-of-hours workload. If however, the results of this study were replicated elsewhere, the possibility that limiting general practitioners involvement in out-of-hours work might be associated with an increasing willingness to undertake visits to patients out-of-hours would be a theory worth exploring further. The observation that the time at which a contact was received was of importance in determining the likelihood of the contact being managed primarily by telephone was not entirely new, having been previously reported in work carried out in Kent (Hobday, 1993; Ridsdill Smith, 1983) and London (Livingstone et al. 1989). The direction of the effect was not consistent however – some doctors appeared more likely to visit contacts later during the evening or night, whilst in others, the opposite effect was evident, and in yet others, no clear influence of time was discernible. The evidence from this study suggests that at least for some doctors time rather than medical need may be a determinant of whether a visit is provided. Further work on a larger sample of less atypical doctors would be required to confirm the differential effect of time on the management of out-of-hours contacts, and to determine other important variables influencing any such association that might be confirmed.

A further variation in doctor behaviour out-of-hours was observed in relation to the prescribing of doctors following out-of-hours contacts with patients. It was judged that different prescribing strategies might result in variable subsequent pressures on the practice appointments system with the potential that this might limit the accessibility of medical care through blocked appointments. This possibility was examined in relation to consultations following presentation of ear, nose, or throat illness out-of-hours. It has previously been suggested (Howie and Hutchison, 1978) that ‘ a policy of high antibiotic prescribing (in respiratory illness) apparently does not reduce the number of patients seeking further consultation and change of treatment in the acute phase of the illness’. That work was based on the retrospective examination of practice records over a seven year period. Treatment ‘failure’ was defined according to the prescribing of an antibiotic, or the change of antibiotic treatment in the two weeks following the initial consultation. The four Aberdeen doctors contributing to the study differed widely in respect of their antibiotic

prescribing in patients with respiratory illness (range 48%-88% of patients receiving an antibiotic). In this study, the likelihood of reconsultation was examined in relation to whether an antibiotic had been prescribed at the initial out-of-hours contact. Although a reduction in the likelihood of reconsultation in the seven days following the initial contact was evident for those patients who had been prescribed an antibiotic, the effect (a 12% reduction in the likelihood of re-consultation compared with a sample of patients with ear, nose, or throat illness who did not receive an antibiotic initially) was small, and is likely to be of limited significance as far as planning of consultation arrangements was concerned. On the basis of the results presented here, the 'large scale prescribing of antibiotics' (Howie and Hutchison, 1978) on the grounds that such a policy might avoid subsequent consultation requests and therefore limit pressure on the consulting arrangements appointments cannot be justified given the medical risks (increased antibiotic resistance, risk of idiosyncratic anaphylaxis or other allergic reactions) that such a policy might engender.

1.2 Seeing the doctor: patient 'flow' and doctor availability

Having identified reduced doctor availability as one potential variable associated with increased out-of-hours workload, it seemed of importance to consider the provision of consulting time as a measure of doctor availability. For the practice examined in the 'flow' study, consulting time was organised on the basis of an appointments system. The second study examined and documented the changes occurring in appointment provision and utilisation, and in patient waiting time and consultation length before and after an increase in the appointment booking interval from 7.5 minutes to one of 10.0 minutes was introduced. The methodology adopted to investigate patient flow (waiting time and consultation length) had been successfully used in similar studies in Lothian (Howie, Porter et al. 1993). The addition of a means of recording measures of the operation of the appointments system permitted calculation of appointment provision and availability, and the numbers of patients seen as 'extras' who were fitted in to the appointments system. Although numerous authors have previously examined issues relating to waiting time and consultation length (Wilson, 1989; Ridsdale et al. 1989; Hill-Smith, 1989), few have examined measures of patient flow in relation to measured workload. Howie's groups work is an exception in this regard, and some similar methods were

adopted in the second study presented here to the methods used by Howie et al, most notably in relation to the means of measuring waiting and consultation times. The effect of introducing a theoretically desirable change in the appointments system (reducing the booking rate from 8 patients per hour to 6 patients per hour) was explored in relation to changes observed in the movement of patients through practices when attending for routine consultations. Providing a smaller number of longer appointments resulted in advantages to patients through reduced waiting times and slightly longer consultations, and in a move towards equalisation of waiting times irrespective of the point in the consulting session at which a patient was seen. The changes were however matched by a greater concordance between the numbers of appointments provided and the numbers of patients actually seen, but also by an increase in the number of patients seen who were classified as 'extras'. These studies provide information on the planning of general practitioner appointments systems in relation to anticipated workload, and propose a target for appointment provision of around 85 appointments per 1,000 registered patients per week for a practice which plans on meeting its routine workload more or less completely within an appointments system. Although a small increase in the proportion of patients having consultations lasting longer than ten minutes was matched by an (even smaller) reduction in the proportion of patients having consultation lasting less than six minutes, the differences observed in the ratio of these measures (the 'long to short consultation ratio' (Howie et al. 1991)) in relation to the changed appointments system was small, and judged not to be a factor of major importance to be considered in the planning of an appointments system. That the work was undertaken in an atypical practice (the same practice which contributed to the previous study) may limit the generalisability of the conclusions drawn, but the successful implementation of a means of recording information relating to the operation of practice appointments systems provided the basis for conducting the central studies of this thesis examining the impact of variations in the operation of practice appointments systems on the use of Accident and Emergency services by patients.

1.3 Accident and Emergency use and doctor availability

The continuing rise in the use of A&E Departments by patients has been the subject of numerous investigations in recent years. Some have attributed the changing pattern of use to a lack of understanding by patients of the 'proper' role of such departments (House of Commons, 1974), but there has been a persistent suggestion in the reports of numerous authors that difficulties in obtaining advice from a general practitioner may be important contributing factors (Horder, 1988; Bowling et al. 1987). Indeed, Fouroughi and Chadwick's suggestion (Fouroughi and Chadwick, 1993) that the problem of the inappropriate use of A&E services amounted to 'abuse' of the service by patients, and was directly related to difficulties in obtaining an appointment with the general practitioner was made despite the evidence of the Newcastle accident survey (Russell, 1977) in which the use of appointments systems by general practitioners was 'not even remotely' related to the choice of location of care exercised by patients. None of these authors however had actually attempted to measure general practitioner accessibility or the operation of practice appointments systems. Russell's conclusions were made on the basis of patients' reports at interview of the initial choice of location of care in relation to their reports of their practices use of an appointments system for all, some, or no consulting sessions. The availability (from the previous study) of a tested methodology for collecting information on appointment provision and availability gave the opportunity of examining the suggestion that there was a relationship between general practitioner accessibility and the use of A&E by patients.

Some of the effects of variations in the operation of appointments systems were examined in a series of studies undertaken in West Lothian, a district adjacent to the City of Edinburgh. Nineteen out of 26 local practices contributed to the study. Since consulting arrangements tend to be peculiar to practices rather than to individual doctors, and since it was judged that the problems of inappropriate A&E use are more likely to be related to patients who self refer rather than to those who are referred by their doctor, the specific hypothesis addressed related to observed variations between practices in rates of Accident and Emergency self-referral by patients in relation to observed variations between practices in appointment provision and availability. A wide range of information was collected about the practices who contributed to the study. Asking patients in a questionnaire survey about their

satisfaction with practices consulting arrangements and about their perception of the availability of a doctor to see them following urgent or non-urgent consultation requests provided two patient based measures of doctor accessibility. Aggregating this information to practice level provided a series of variables highlighting differences between practices in relation to their patients' perceptions of doctor availability. Whilst the principal focus of this investigation related to variations between practices in the rate of A&E use by patients, collecting information about satisfaction with consulting arrangements and patients' perceptions of doctor availability gave the opportunity to examine any relationships which might exist between these variables when aggregated to practice level.

The range of operation of consulting arrangements was described for 19 practices contributing to a study investigating the association of general practice appointments system operation with patients' dissatisfaction with consulting arrangements, and with patients' use of local A&E services at the nearby district general hospital. Considerable variation existed amongst the 17 practices which operated an appointments system in the consulting arrangements they offered to patients. Although the operation of general practice appointments systems did not appear to be an important determinant of the use of A&E services by patients from West Lothian, patients who attended A&E appeared to be more dissatisfied with the arrangements for seeing a general practitioner in their practice than were a sample of patients attending their general practitioner; this observation held true after controlling for casemix. Furthermore, patients' dissatisfaction with the arrangements for seeing their general practitioner was related to the operation of general practitioners' appointments systems. Greater levels of dissatisfaction were reported by patients from practices which offered fewer appointments or which had fewer appointments unbooked at the start of the working day or which saw a higher proportion of patients who were identified as 'extras' by reception staff when compared with practices providing more appointments, more unbooked appointments, or fewer 'extras'. Such an observation is broadly in line with results reported by Baker and Streatfield (1995) and Allen et al (1988) who assessed patient satisfaction with various elements of practice organisation. Both of these studies involved surveys of patients, and the first also involved collection of information from practices. Allen et al concluded that patient satisfaction with access to general practitioners was related to the efficiency

of their general practitioners access arrangements (appointments systems, telephone access, and out-of-hours arrangements). Baker and Streatfield suggested that ‘the most important variables influencing patient satisfaction were total list size, and the availability of a personal list system’ (in which patients generally see the same doctor on each occasion). In contrast with this present work neither of these studies actually measured the provision or availability of appointments over a period of time. Whilst the issue of personal availability was not specifically addressed in this present work, the operation of practice appointments systems was measured over a period of 8 weeks. Patient satisfaction with access arrangements was measured over a one week questionnaire survey period, and it is thus believed that the work presented here provides a valuable contribution to the literature in respect of patient satisfaction with general practitioner accessibility. Increased dissatisfaction with consulting arrangements was also associated with patients’ perceptions of poorer availability of a doctor following a non-urgent consultation request.

The issues of patients’ perceptions of doctor availability was examined in more detail. Whilst some authors have previously examined doctors’ reports of their availability (Butler and Calnan, 1987), few studies (Baker and Streatfield, 1995; Ritchie et al. 1981) have examined influences on patients’ perceptions of doctor availability. It is worth quoting from one of these studies’ conclusions:

“... it appears that the type of practice people use and the way the practices are administered have remarkably little effect on how often people consult their doctors ... Certainly there is no evidence that the more modern forms of practice organisation reduce the frequency of consultation: people using larger group practices, those in health centres and ones with receptionists or appointments systems .. consulted just as often as others. On the other hand, being on a large list and living some distance from the surgery did appear to have a slight deterrent effect. How often people say they consult the doctor, however, depends very much more on their age, sex and social class than on any aspect of the organisation or accessibility of the practice they use.”

(Ritchie et al. 1981 page 51)

It seems likely that patients’ perceptions of the way practice appointments systems operate will be at least as important in determining their reports of doctor availability as (for example) the actual measured operation of an appointments

system. In this study, patients were asked how soon they thought they could be seen by a doctor from their practice following either an urgent or a non-urgent consultation request (building on the work of Butler and Calnan(1987)). Patients' responses were aggregated to practice level, and compared with a number of other practice characteristics. The reported availability of general practitioners varied widely between the practices although a greater variation was seen between practices in patients' perceptions of doctor availability following a non-urgent consultation request than that observed in relation to an urgent consultation request. The number of patients seen who were identified as 'extras' was negatively associated with the perceived availability of a doctor following a non-urgent consultation request, and (as suggested in Ritchie's survey of patients(Ritchie et al. 1981)) practices with smaller list sizes appeared to have advantages with regard to their patients' perceptions of doctor availability compared with larger practices. Whilst patients' perceptions of doctor availability seemed to be of some importance as a determinant of patient dissatisfaction with consultation arrangements, other sequelae resulting from variations in patients' perceptions of doctor availability were not investigated in detail. The literature review identified a number of measures of accessibility including measures of geographical accessibility, and rates of service utilisation. When measured at practice level in this study, the observed variation in workload amongst practices (reflecting service utilisation) was independent of the reported availability of a doctor following either an urgent or a non-urgent consultation request. It is likely however that the relationship between service utilisation and perceptions of doctor availability would be better measured at the level of the individual patient since both of these measures are known to be subject to factors operating at the level of the individual (such as age, sex, and socio-economic status). This was not the focus of the present work (which specifically addressed issues relating to variations between practices rather than between patients), and further work using the patient as the unit of investigation would be required to investigate any such association.

Having investigated patients' perceptions of doctor availability, patients' perceptions were also investigated with regard to their perceptions of medical urgency. Previous work has suggested that patients' perceptions of the seriousness of symptoms may relate to their social class (Wyke et al. 1990), although there have been no reported

studies examining the relationship between the perceived 'seriousness' of symptoms and the translation of that perception to a consultation request with a specified degree of 'urgency'. In this study, patients' perceptions of urgency were measured using their reports of how soon they considered that patients outlined in a series of brief clinical vignettes should be seen by a doctor. Previous authors have reported the successful use of case vignettes to develop an 'action score' based on the assessment of vignettes by mothers of young children (Morrison et al. 1991; Champion and Gabriel, 1985). As in these previous studies, responses were coded numerically. Summed responses were used to create a medical urgency score for each respondent. Scores had a normal distribution, and respondents who lived in local authority accommodation, or who did not own a car, or who were unemployed had a heightened sense of medical urgency when compared with less deprived patients in each of these categories. The most deprived patients (assessed using a combination of the three categories of deprivation outlined above) were observed to have the greatest sense of medical urgency when compared with others who were less deprived. Respondents' perceptions of medical urgency explained only a small part of the variance in their perception of doctor availability following a non-urgent consultation request, and was not related to their perceptions of doctor availability following an urgent consultation request. The series of vignettes presented to patients in the questionnaire had been piloted in the author's practice where it had been found to be comprehensible to a wide range of patients, most of whom had satisfactorily completed the questionnaire. Vignette scenarios were selected to represent a range of seriousness of symptoms as agreed by a group of doctors contributing to the development of the questionnaire. Formal validation of the use of the vignettes to assess patients' perceptions of medical urgency was not carried out – this might have been done through an analysis of patterns of historic consulting behaviour and comparing this with medical urgency scores, and also through an assessment of medical urgency by a group of general practitioners providing a standard against which patient' responses were judged. The alternative approach of using the vignettes developed by Champion and Gabriel has the attraction of using a previously validated instrument. Three factors however meant this was not possible: (i) the vignettes were not validated for the assessment of 'urgency' having been developed in a framework of predicting consulting behaviour (ii) the vignettes were validated for use in mothers of young children, not for a general survey of patients attending the doctor (iii) the author was not aware of the availability of the instrument until

after the present study was completed. The instrument adopted for the assessment of patients' perceptions of medical urgency described in this present work should be regarded as potentially useful, but requiring further evaluation and validation prior to more widespread use.

A model for predicting patient satisfaction with consultation arrangements has been developed based on the results presented in these studies. After aggregation of data to practice level, patient dissatisfaction with practice consulting arrangements was independently predicted by their perception of doctor availability following an urgent or a non-urgent consultation request, and also by the number of patients seen as 'extras'. Whilst practice list size was associated with patient dissatisfaction with consulting arrangements (smaller practices appearing to have advantages over larger practices), the effect appeared to be mediated through the independent effect of practice list size on patients' perceptions of doctor availability. Baker has also reported the importance of practice list size as a determinant of patient satisfaction with doctor availability (Baker and Streatfield, 1995), but this present study involved an examination of the operation of practices' appointments system at the time that the questionnaire survey was undertaken, and so was able to identify the importance and contribution of the operation of the appointments system (as measured by the number of patients identified as 'extras' by reception staff) in influencing patients' dissatisfaction with consulting arrangements.

1.4 Defining doctor availability – a role for geographical information systems?

Although mapping of health information has taken place for many years (mostly in relation to the epidemiology of disease), the development of geographical information system (GIS) technology in recent years has meant that mapping of health related information is now readily available to those undertaking health services research. Of the more recent studies involving primary care, one of the earliest used labour intensive manual mapping methods to define the accessibility of primary medical care in Aberdeen, Scotland (Richardson and Dingwall-Fordyce,

1968). Even more recently, other authors have used GIS techniques from the discipline of medical geography to demonstrate that patients do not always choose to register with their nearest practice(Phillips, 1979) or that the location of service centres can be planned to maximise their accessibility for potential users of the service(Clarke, 1992; Curtis, 1989). In the final two studies presented in this thesis, the potential for GIS technology to provide additional insights into, and further define the accessibility of primary care was explored.

The first of these studies involved undertaking a case study examining the potential use of various elements of GIS technology when applied to information obtained about patients and practices in the previously described West Lothian studies. Whilst the distance decay effect on Accident and Emergency service utilisation had been previously identified in an earlier phase of the analysis of the West Lothian data, plotting of distance buffers centred on the A&E department at St John's Hospital, Livingston on overlain maps of West Lothian provided a visually striking demonstration of the effect of distance on A&E utilisation by patients from practices in West Lothian. Whilst simple mathematical modelling can provide insight into the effect of straight line distance on A&E utilisation rates, the use of GIS technology permits almost unique insights into the effect of the (more realistic) influence of road network distance on A&E utilisation rates. Manual methods incorporating road network distances would be possible, but not practical on anything but a small scale. Application of GIS technology to the dataset permitted calculation of the effect of road network distances between practice and A&E department on A&E self-referral attendance rates aggregated to practice level for large numbers of questionnaire respondents attending West Lothian practices. More sophisticated mapping techniques involving the construction of Thiessen polygons, convex hulls, and spider maps were employed to explore issues relating to the accessibility of primary care in West Lothian. Contour mapping of patients' responses to a question on their perception of distance between their home address and their practice demonstrated the problems of practice accessibility reported by some patients who were geographically closer to the practice than other, more distant, patients who reported less difficulty with access. Plotting of questionnaire respondents' perceptions of distance to their practice against actual road network distance between the practice and their home address portrayed problems of accessibility for patients of one

practice who, although living in close geographical proximity to the practice, perceived the practice to be more distant than was actually the case. This observation highlights one of the difficulties encountered in using GIS technology in the manner described. 'Distance' is a rather loose concept covering not only a measurable geographical divide (which may be the shortest distance between two points, or which may take account of road networks), but also touching on issues relating to travel time, and availability of transport. To begin to investigate this matter would require undertaking a study of such issues as the social, economic, and psychological factors influencing the perception of distance, and it was judged that this was outside the remit of this present work. The case study was undertaken to begin to explore the potential for the use of GIS technology in defining the accessibility of primary care, and it was concluded that this technology represented a useful facility providing additional insights into accessibility beyond that which was readily available by other means. The initial investigation of the use of convex hulls defining measurable geographical areas provided the basis for undertaking the final study of the thesis which investigated the sizes of catchment areas amongst practices in the London Borough of Lambeth.

Some of the earlier work outlined in this thesis suggested that smaller practices had advantages for patients in improved perception of doctor availability reported by patients from such practices when compared with patients from larger practices. Like many previous studies however (Baker and Streatfield, 1995; Howie et al. 1989; Butler and Calnan, 1987; Wilkin and Metcalfe, 1984; Butler, 1980), practice size was examined in terms of the numbers of patients registered with the practice. Under their terms of service, general practitioners are required to define the area in which they will register patients and provide services, raising the possibility of examining a different measure of practice size from that adopted previously – the practice catchment area. Few studies have previously examined the issue of practice catchment area (Richardson et al. 1975; Richardson and Dingwall-Fordyce, 1968) and no previous studies have measured the size of catchment areas of UK general practices. Whilst it would be possible to calculate approximate sizes of practice catchment areas by plotting these areas manually onto maps prior to measuring the defined area, the availability of GIS technology, and in particular the consideration of practice catchment areas as convex hulls whose areas can be readily

measured using this software, gave rise to the hypothesis that GIS technology could be used to define the size of general practice catchment areas. Recognising that practices with small list sizes may have advantages in patient care when compared with larger practices, it also seemed relevant to consider the variation between practices with regard to catchment area, and to examine whether any relationship existed between the size of practice catchment area and the range and quality of services provided by practices.

The setting chosen to examine these issues was practices within the London Borough of Lambeth. It is recognised that practices in different ecological settings will have large variations in catchment area – many rural practices are recognised as providing services to patients over practice areas that may cover hundreds of square miles. Examining the issues outlined above required that practices in similar ecological setting should be compared. It would be reasonable to compare catchment areas of practices from rural, semirural, urban, or inner-city areas, but not to compare (for example) rural with urban or inner city practices. As no similar work has been undertaken, this work could be considered a descriptive pilot study. As this was an initial investigation, it was decided to undertake the study only of practices operating in an inner city setting. A census survey of all 71 inner-city practices in Lambeth resulted in the provision of up-to-date maps of practice catchment area for 60 practices providing services in this relatively homogeneous deprived area. When converted to electronic format ('digitised'), catchment areas were readily calculated for these practices, and a 150-fold difference (0.19-28.27 sq miles) between the smallest and largest area observed. A 300-fold difference was observed between practices after catchment area was corrected for the number of doctors in the practice, and a similar variation observed for patient dispersion – the number of patients per square mile of practice catchment area. It therefore proved possible to measure practice catchment area using GIS technology, and to describe the considerable differences which existed between practices providing care in a similar inner city setting. The catchment areas investigated were defined using up-to-date maps of the practice catchment area. It is possible that the actual size of catchment area operated by general practitioners may not be co-terminous with the area defined by the map – doctors remain free to register patients at whatever address they are willing to accept. Furthermore, the dispersion of patients within the catchment area

may not be homogeneous – one might predict that a small number of patients relocating out from the centre of the practice (and indeed possibly moving outside the practice area) might be retained on the practice list by the doctor (Phillips, 1979). In view of this, it would be of interest to compare the size of the catchment area defined by the practice map with the size of the catchment area defined by the patient population and also with the size of the catchment area defined by the patient population excluding (say) the 5% living furthest from the practice. All of these investigations could be effectively carried out using the techniques described in this thesis, and would provide the basis for further interesting work.

A local measure of the range and quality of service provided by practices was used to investigate the relationship between catchment area and the quality of service provision. The measure adopted incorporated a number of recognised performance indicators (NHS Executive, 1998; Majeed and Voss, 1995) relevant to primary care provision in a four-category banding system applied by the health authority to all local practices. When compared with practices providing an extensive range of high quality services, practices providing only a limited range of lower quality services (as assessed by banding criteria) were observed to have larger catchment areas and to have a more widely dispersed patient population. Patients registered with such practices were therefore doubly disadvantaged when compared with patients registered with ‘stronger’ practices in having to travel longer distances to receive care from a ‘weaker’ practice.

These investigations of practice catchment area, the first of their kind, raise the issue of the size of catchment area across which it is reasonable for a doctor, or group of doctors to provide services. Little is known of the process and influences by which a doctor or group of doctors come to define the area in which they will operate. Legislation currently places a limit on the number of patients for which a general practitioner might provide care, but no similar legislation exists in relation to the size of the area in which (s)he might operate. Whilst the results of this study would not by themselves suggest that such legislation should be introduced, the information provided gives a basis for undertaking similar work in relation to practices operating in different ecological environments, and in examining whether the results obtained hold true in different inner-city settings.

2 Further Work

The accessibility of primary medical care is an important concept to be considered when examining the provision of primary medical care. The studies described previously have highlighted many potential areas which should be investigated in further studies. Four important areas have been identified as suitable areas for further investigation spawned by the studies presented in this thesis.

2.1 Appointments system operation

These studies have examined global and rather crude measures of appointment system operation. Only very limited qualitative work has been reported, and it would be of value to validate the methods described and the measures adopted in these studies against the expressed views of patients at interview. At the outset of this work, it was hoped to develop a scoring system for the evaluation of appointments systems bringing together measures of provision, availability, and patient flow in one global score. Until further refinement of the measures used has been undertaken, and these measures validated against objective standards, it would not be wise to pursue this objective. Having said this, the measures of appointment system operation were successfully developed and used in one practice before being used to describe the range of appointment provision amongst a group of geographically related practices. As a comparison, it would be of interest to examine the appointment operation and consulting arrangements in practices drawn from different geographic and socio-economic settings - for example in the inner city, or in a rural situation. The issue of out-of-hours workload and provision has been debated extensively in recent years in the UK, and this thesis has reported the association of a potential doubling in the out-of-hours workload on days when the appointments system was been fully booked. Again, this work was based on results drawn from only one practice, and it would be of value and interest to explore the possibility that variations in the daytime accessibility of general practitioners (perhaps including the total amount of routine consulting time provided) might affect the volume and pattern of demand for out-of-hours care. Such work might also usefully examine the structure and process of

providing such care, and thus the relationship between in-hours and out-of-hours provision of primary medical care.

2.2 Practice Size

The numbers of patients a general practitioner or practice can adequately provide care for has been the subject of extensive investigation since the inception of the National Health Service. Results presented here suggest that practice list size may be an important variable influencing patient satisfaction with the arrangements for seeing a doctor, and also influencing patients' perceptions of doctor availability, especially in the non-urgent situation. The issue of practice size has also been explored from the perspective of the geographical area over which general practitioners and practices offer to provide services. An association between a measure of quality and practice catchment area has been reported. Given these observations, further work is required to examine issues relating to the structure and delivery of primary medical care²⁷. In the light of work presented here, one might reasonably ask whether the present guidance and controls on practice list size are appropriate in the context of the central position of general practice/ primary care within the overall provision of health care in the UK - the evidence from this work suggests that smaller rather than larger list sizes may be advantageous for patient care. This work has not incorporated any health economic analysis examining the relative cost of smaller rather than larger units of service delivery. Clearly, issues of accessibility are only one (perhaps hitherto neglected) component of a complicated equation in which a balance needs to be achieved between economic cost on one side, and professional and public expectations, perceptions and aspirations on the other. Optimal practice list size remains to be defined, but in the light of issues addressed here one might also speculate that guidance and/or controls should be introduced on the size of the practice area across which general practitioners provide services.

The measure of quality adopted in the study examining practice catchment areas was a locally adopted banding measure of quality developed by one health authority as a performance indicator used for setting practice staffing budgets. Whilst performance

²⁷ Funding has been secured for a study examining the issue of quality of care in relation to practice size amongst a sample of volunteer practices in North and South Thames.

indicators have been the subject of recent research, this particular measure has not yet been validated as a 'true' measure of 'quality' in primary care. The banding measure incorporates a number of elements of information derived from practices, but such a measure requires refinement, and probably the incorporation of other potential indicators of quality (factors such as the numbers of patients seen as 'extras', or the availability of appointments, or the practice's involvement in undergraduate or postgraduate medical education might be considered for inclusion for example).

2.3 Patient perceptions

Information has been presented regarding patients' perceptions of the availability of general practitioners, and also on their perception of medical urgency. It would be of interest to relate these reports of general practitioner availability to measured availability in a study following up the outcome of patients' requests for consultations. The potential sequelae resulting from variations in patients' perceptions of doctor non-availability are far reaching, and in these studies, patients with poorer perceptions of doctor availability were also more dissatisfied with the arrangements for seeing a doctor. Further studies would be required to examine the consequences of variations in the perceived availability of general practitioners, and the potential effects such variations might have on patterns of consulting.

Consideration might profitably be given to examining these variations in relation to who is consulted (including the potential role of family and friends in supporting the individual patient, and other community based services such as those provided by community pharmacists), and where and when the consultation takes place.

Patients' perceptions of medical urgency were assessed from their responses to a series of clinical vignettes. Analysis of a calculated score for medical urgency showed that these were normally distributed. Patients who were materially deprived appeared to have a heightened perception of urgency. It appeared that variations in patients' perceptions of medical urgency explained only a small part of the variation in their perception of doctor availability. Further work is required to investigate this aspect of patients' health beliefs, and to examine the issue of the relationship between patients' perceptions of medical urgency and their perception of 'seriousness' of symptoms (the latter notion having been more frequently examined in previously reported research referred to in this thesis).

2.4 The Primary/Secondary Interface - the A&E Department

Investigation of the relative contribution of general practice (including primary care out-of-hours services) and the A&E Department to out-of-hours provision has been plagued by difficulties encountered when considering the concept of 'appropriateness' of location for care. It is likely that influences on overall pattern of demand for services need to be investigated with a view to considering whether there are indeed systematic variations evident amongst groups of patients, or between groups of practices in the demands placed on services, and if so, what factors might be identified as being potentially subject to modification. Whilst results have been presented considering the effect of variations in practice appointment availability, other factors relating to the accessibility of general practitioner services need also to be considered - such as the hours during which general practitioners provide services, or their telephone availability. Few studies have measured this latter concept, and in view of the desire expressed by many patients to have access to such a facility, it would be appropriate and timely to undertake such work, perhaps utilising technologies now available for electronically monitoring the activity of practice telephone lines. Furthermore, alternatives to the traditional patterns of service delivery need to be explored with an examination of community based out-of-hours centres, nurse led minor injury units, and increased multi-disciplinary service centres providing access to seamless care, especially important outside of normal working hours.

3 Epilogue

This thesis has examined issues relating to the accessibility of primary medical care to patients within the context of the UK National Health Service. An extensive review of the relevant literature has been undertaken. The experimental work reported here relates primarily to the impact of general practitioner appointments systems on the accessibility of primary care. The relationship between the operation of general practice appointments systems and the accessibility of primary care is explored in the context of studies reporting an increase in the likelihood of out-of-hours workload in relation to a fully booked appointments system, the need to establish the operation of appointments systems in general practice taking account of the issues of demand, efficiency, and flexibility, and reporting the lack of an association between practice patient A&E attendance rates and general practice appointment availability.

Further investigation of the accessibility of primary care has been undertaken through the use of geographical information system technology (GIS). The potential use for GIS in exploring issues of accessibility was examined using data derived from the West Lothian studies as a case study. GIS technology provided a fresh perspective on these datasets, and visually highlighted some of the possibilities for such technology in relation to primary care research. In the final study of this thesis, GIS technology using data derived from 60 practices situated in Lambeth, South London. Large variations were observed in practice catchment areas, and in practice catchment area corrected for the numbers of patients on the practice list, and for the number of doctors providing services to the patients. These measures of practice catchment area were investigated in relation to a locally adopted banding measure of quality of care. Weaker practices had larger catchment areas and relatively larger numbers of deprived patients than stronger practices. Patients registered with such practices therefore appeared to be potentially doubly disadvantaged - to be suffering from the effects of deprivation on health *per se* and also to have greater distances to travel to receive primary medical care from practices providing only a limited range of services.

Primary medical care is at the very heart of the publicly funded health care system in the United Kingdom. Problems do exist, and the dissatisfaction expressed by some patients in this study is a reflection of some of the difficulties patients perceive within the system of delivering primary care. Inequalities exist in the health status of individuals within society, and some of these inequalities may be associated with differences in the accessibility of primary care experienced by some members of the population. Measuring the availability of appointments and the operation of appointments systems is one of a number of ways of unpacking some of the present practices being adopted by primary health care teams in managing the delivery of care. Such arrangements are not universally popular however - with patients, or with the doctors providing these arrangements. Considerable scope remains to examine current practice in more detail with a view to identifying gold standards by which accessibility may be assessed. The studies reported in this thesis have perhaps helped to inform and clarify an approach to standard setting which offers practical support to those considering monitoring or evaluating the accessibility of community based primary care. I believe primary medical care - and general practice in particular - is indeed the jewel in the crown of a strong and effective national health service. The potential of this dimension of care is enormous, but to achieve that potential, the system must become and remain transparent, comprehensible, and accessible to those the system purports to serve.

Appendices

Appendix A Appointment System Questionnaire

(Unique number)

APPOINTMENT SYSTEM QUESTIONNAIRE

This questionnaire asks you about the appointment system in this surgery, and your experience of it today. It is part of a study being carried out by the doctors and receptionists here along with the University of Edinburgh. Please help by filling it in and returning it to the Reception desk.

PLEASE ANSWER ALL THE QUESTIONS ANSWERING ONLY ONE OPTION FOR EACH QUESTION. IF THE PATIENT IS

**A CHILD. PLEASE ANSWER THESE QUESTIONS FROM THEIR POINT OF VIEW -
RECORDING HIS/HER DATE OF BIRTH, SEX etc**

- 1 Please give today's date: _____
- 2 Please record the time just now _____
- 3 How long have you been registered with this practice? Less than one year
More than one year

TWO QUESTIONS ABOUT YOUR VISIT TO THE SURGERY TODAY:

- 4 Who are you seeing today? Doctor
Nurse
Doctor and nurse (together)
Doctor and nurse (separately)
- 5 Are you attending a special clinic or a normal surgery today? SPECIAL CLINIC NORMAL SURGERY

WE NOW ASK ABOUT YOUR REASON FOR VISITING THE SURGERY TODAY

- 6 How long have you had the problem about which you are visiting the surgery today? Less than 8 hours
8 - 24 hours
1 - 2 days
2 - 7 days
7 - 14 days
More than 14 days
- 7 Do you think your problem could have been dealt with by talking to a doctor on the telephone? YES NO DON'T KNOW
- 8 Please describe the type of problem about which you are visiting the surgery today
- Accident
Recent illness
Flare up of symptoms previously dealt with yourself
Flare up of symptoms previously seen by doctor or nurse
Illness or problem present for a long time
Don't know

THE NEXT FOUR QUESTIONS ARE ABOUT THE ACCESSIBILITY OF THE SURGERY FOR YOU

- 9 Roughly, how far is it from your home to the surgery? Less than one mile
1 - 2 miles
2 - 5 miles
More than 5 miles
- 10 How long does it normally take you to get to the surgery from your home? Less than 15 minutes
15 - 30 minutes
30 - 45 minutes
45 - 60 minutes
More than 60 minutes
- 11 How did you get here today? Public transport (eg bus)
Private transport (eg car)
Walked
- 12 Where have you travelled from just now? Home
Work
Other

NOW A FEW QUESTIONS ABOUT YOUR APPOINTMENT TODAY

- 13 For your attendance today have you: Been given an appointment time
Just turned up, hoping to be seen
Been told to come and wait

If you have been given an appointment, please answer all questions on this page.

If you do not have an appointment, please go to next page.

- 14 How long ago was the appointment made? Today
Yesterday
2 days ago
3 - 7 days ago
1 - 2 weeks ago
More than two weeks ago
- 15 Was the appointment for the day you wanted? YES NO
- IF NO**, did you want to see a doctor sooner?
and, how convenient was today? YES NO
- Absolutely fine
Basically OK
Some inconvenience
Inconvenient
- YES NO DIDN'T
MIND

16 Was the appointment for the time you wanted?

IF NO, was today's time...

Absolutely fine
Basically OK
Some inconvenience
Inconvenient

17 Was the appointment for the doctor you wanted?

YES

NO

DIDN'T
MIND

18 How helpful was the receptionist in arranging the appointment?

Very helpful
Helpful
50/50
Unhelpful
Very unhelpful

19 Was the appointment made by telephone?

YES

NO

IF YES, did you have difficulty getting through to reception?

A lot

A little

NO

NOW A FEW QUESTIONS ABOUT THE ARRANGEMENTS FOR SEEING A DOCTOR IN THIS SURGERY. PLEASE ANSWER ONE OPTION ONLY IN EACH QUESTION

20 For an **URGENT** problem when can you normally be seen by a doctor in this surgery?

Same day
The day after
2 - 7 days later
More than 7 days later
Don't know

21 For an **NON-URGENT** problem, when can you normally be seen by a doctor in this surgery?

Same day
The day after
2 - 7 days later
More than 7 days later
Don't know

22 Overall, how satisfied are you with the arrangements for seeing a doctor in this surgery

Very satisfied
Satisfied
50/50
Dissatisfied
Very dissatisfied

- 23 How long after a given appointment time do you normally wait to be seen in this surgery
- 0-5 minutes
5-15 minutes
15-30 minutes
30-45 minutes
45 mins +
Don't know

YES NO

Is this acceptable?

NOW SOME QUESTIONS ABOUT YOUR USE OF EMERGENCY SERVICES

- 24 Have you called the doctor to your home during the evening or night or at the weekend during the last 5 years YES NO
- 25 How often have you been to the hospital casualty (Accident & Emergency) Department for yourself during the last five years? Never
Once
Twice
More than twice

IF YOU HAVE ATTENDED, did a doctor or nurse send you? Each time

Sometimes
Never

WE WOULD APPRECIATE SOME PERSONAL INFORMATION

*(Remember, if the patient is a child please record **HIS/HER** date of birth/sex etc)*

- 26 What is your date of birth? _____
- 27 Are you Male Single
Female Married/cohabiting
Divorced/widowed
- 28 Is your accommodation.. Owner occupied(owned or mortgaged)
Council rented(or housing association)
Privately rented
- 29 What is your postcode? _____
- 30 Are you unemployed at present? YES NO
- 31 Do you or your husband/wife/partner own a car? YES NO

PLEASE TICK ONE BOX FOR EACH OF THE FOLLOWING STATEMENTS AS TO WHETHER YOU AGREE WITH THEM OR NOT:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
GPs can deal with most cuts and bumps as effectively as the hospital					
People should have to contact their family doctor before attending hospital emergency Departments					
People over-use medical services					
If patients could speak to a doctor on the telephone this would reduce the number of visits made to their GP					
Family doctors should be available for medical advice and help at all times of the day and night					
It can sometimes be difficult to get an appointment with my doctor at this surgery					
I find this surgery very difficult to get to					
It can be hard to get an appointment for medical care right away at this surgery					

HOW SOON DO YOU THINK THE FOLLOWING PATIENTS SHOULD BE ABLE TO SEE THEIR FAMILY DOCTOR?

	Immed- ately	Same day	Within 2 days	Within 7 days	No nee to see doctor
Yourself, having pains in the front of the chest					
25 year old office clerk with a sore throat for two days					
40 year old labourer with itchy rash on hands					
Painful periods in a 20 year old woman					
Chest pains in a 45 year old man					

Headache and joint pains in a 65 year old woman

Recent sticky discharge (18 hours) from the eyes
of an 8 month old baby?

Runny nose in a 15 year old schoolboy

If you have had diarrhoea for two days?

If you had a minor cut from a broken bottle?

**WHAT WOULD YOU DO IF YOU HAD STRAINED YOUR ANKLE, BUT THE RECEPTIONIST
SAID THE DOCTORS' APPOINTMENTS WERE FULL FOR THE DAY?**

HOW COULD THE ARRANGEMENTS FOR SEEING A DOCTOR HERE BE IMPROVED?

**THANK YOU FOR COMPLETING THIS QUESTIONNAIRE
IT WILL HELP US TO REVIEW OUR APPOINTMENT SYSTEM**

Appendix B Accident And Emergency Services Questionnaire

- | | | | | |
|----|--|----------------------------|------------|---------------------|
| 12 | Do you think your problem could have been dealt with by talking to your family doctor on the telephone? | YES | NO | DONT
KNOW |
| 13 | How soon do you think your family doctor would have been able to see you for this problem? | Today | Tomorrow | 2 - 7 days from now |
| | | More than 7 days from now | Don't know | |
| 14 | Please describe the type of problem about which you are visiting the hospital today: | | | |
| | Accident | | | |
| | Recent illness | | | |
| | Flare up of symptoms previously dealt with yourself | | | |
| | Flare up of symptoms previously seen by doctor or nurse | | | |
| | Illness or problem present for a long time | | | |
| | Don't know | | | |
| 15 | How did you get here today? | Public transport (eg bus) | | |
| | | Private transport (eg car) | | |
| | | Walked | | |
| 16 | How far is it from your home to St Johns hospital (Please estimate if not sure) | Less than 1 mile | | |
| | | 1-2 miles | | |
| | | 2-5 miles | | |
| | | 5+ miles | | |
| 17 | How long does it normally take you to travel to St John's Hospital from your home? | Less than 15 minutes | | |
| | | 15 - 30 minutes | | |
| | | 30 - 45 minutes | | |
| | | 45 - 60 minutes | | |
| | | More than 60 minutes | | |
| 18 | Where have you travelled from just now? | Home | | |
| | | Work | | |
| | | Doctor's surgery | | |
| | | Other | | |

NOW A FEW QUESTIONS ABOUT THE ARRANGEMENTS FOR SEEING YOUR FAMILY

DOCTOR. PLEASE ANSWER **ONE** OPTION ONLY IN EACH QUESTION

- 19 Who is your family doctor? _____
- 20 Where is his/her surgery _____

- 21 How long have you been registered with your family doctor/GP Less than one year
More than one year
- 22 Roughly, how far is it from your home to the doctor's surgery? Less than one mile
1 - 2 miles
2 - 5 miles
More than 5 miles
- 23 How long does it normally take you to get to the surgery from your home? Less than 15 minutes
15 - 30 minutes
30 - 45 minutes
45 - 60 minutes
More than 60 minutes
- 24 Does your family doctor operate an appointment system YES NO DONT KNOW
- 25 For an **URGENT** problem when can you normally be seen by a doctor in your surgery? Same day
The day after
2 - 7 days later
More than 7 days later
Don't know
- 26 For an **NON-URGENT** problem, when can you normally be seen by a doctor in your surgery? Same day
The day after
2 - 7 days later
More than 7 days later
Don't know
- 27 Overall, how satisfied are you with the arrangements for seeing your family doctor/GP in your surgery Very satisfied
Satisfied
50/50
Dissatisfied
Very dissatisfied
- 28 How long after a given appointment time do you normally wait to be seen in your surgery 0-5 minutes
5-15 minutes
15-30 minutes
30-45 minutes
45 mins +
Don't know

YES NO

Is this acceptable?

NOW SOME QUESTIONS ABOUT YOUR USE OF EMERGENCY SERVICES

- 29 Have you seen the doctor at home during the evening or night or at the weekend during the last 5 years YES NO
- 30 How often have you **previously** been to the hospital casualty (Accident & Emergency) Department for yourself during the last five years? Never
Once
Twice
More than twice
- 31 **IF YOU HAVE PREVIOUSLY ATTENDED CASUALTY,** did a doctor or nurse send you? Each time
Sometimes
Never
- 32 **WHAT WOULD YOU DO IF YOU HAD STRAINED YOUR ANKLE AND WANTED TO SEE YOUR FAMILY DOCTOR, BUT THE RECEPTIONIST SAID THE DOCTORS' APPOINTMENTS WERE FULL FOR THE DAY?**
-
-

PLEASE TICK ONE BOX FOR EACH OF THE FOLLOWING STATEMENTS AS TO WHETHER YOU AGREE WITH THEM OR NOT:

- | | Strongly
Agree | Agree | Neutral | Disagree | Strongly
Disagree |
|--|-------------------|-------|---------|----------|----------------------|
| GPs can deal with most cuts and bumps as effectively as the hospital | | | | | |
| People should have to contact their family doctor before attending hospital emergency Departments | | | | | |
| People over-use medical services | | | | | |
| If patients could speak to a doctor on the telephone this would reduce the number of visits made to their GP | | | | | |
| Family doctors should be available for medical advice and help at all times of the day and night | | | | | |
| It can sometimes be difficult to get an appointment with my doctor at my surgery | | | | | |
| I find my surgery very difficult to get to | | | | | |
| It can be hard to get an appointment for medical care right away at my surgery | | | | | |

HOW SOON DO YOU THINK THE FOLLOWING PATIENTS SHOULD BE ABLE TO SEE THEIR FAMILY DOCTOR?

Immed- Same Within Within No need
ately day 2 days 7 days to see doctor

Yourself, having pains in the front of the chest

25 year old office clerk with a sore throat for two days

40 year old labourer with itchy rash on hands

Painful periods in a 20 year old woman

Chest pains in a 45 year old man

Headache and joint pains in a 65 year old woman

Recent sticky discharge (18 hours) from the eyes
of an 8 month old baby?

Runny nose in a 15 year old schoolboy

If you have had diarrhoea for two days?

If you had a minor cut from a broken bottle?

THANK YOU FOR COMPLETING THIS QUESTIONNAIRE

Publications

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Campbell, J.L. Out-of-hours workload. *British Journal of General Practice* 40 215-216, 1990.

Campbell, J.L. and Howie, J.G.R. Changes resulting from increasing appointment length: practical and theoretical issues. *British Journal of General Practice* 42:276-278, 1992.

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Parker, E.B. and Campbell, J.L. Measuring access to primary medical care: some examples of the use of geographical information systems. *Health and Place* 1998 (in press).

Campbell, J.L. Accident and Emergency utilisation and deprivation *British Medical Journal* 316 1998 (in press)

reinforced the need for practice nurses to be taught by practice nurses.

We hope this work will further the development of practice nurse education in general practice.

P A GREEN
J D HOWITT

Torbay Local Medical Committee
c/o 1 Fortescue Road
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M WHITE
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Cheques payable to the Vale of Trent Faculty, RCGP.

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Books for general practitioners

Sir,

A study of general practitioners' use of postgraduate centre and practice premises libraries has been undertaken in the Vale of Trent faculty area of the Royal College of General Practitioners. A simple questionnaire was sent to all principals via the family practitioner committees in the area. The aim of the survey was to find out how many general practitioners had books on their practice premises and to determine the use made of their own practice libraries and of the postgraduate centre libraries.

Of 893 doctors, only 216 (24%) replied from 136 practices. Less than half of the practices had 50 books or more on their premises. Most of the remainder had 10-50 books. It was interesting to note the general practitioners' choices of the most useful books of reference. The five most frequently chosen books were: Fry's *Illustrated guide to dermatology*; the *British national formulary*; the *Oxford textbook of medicine*; Price's *Textbook of medicine* and Balint's *The doctor, his patient and the illness* (mentioned by 47, 45, 39, 20 and 20 doctors, respectively).

Postgraduate centre libraries appeared to be greatly under-used by general practitioners — a fact which might repay more detailed enquiry. From our survey and from general practitioners and postgraduate centre librarians in Nottinghamshire, Derbyshire and Lincolnshire a fairly comprehensive reading list has been compiled; our thanks go to them, to Margaret Hammond, RCGP librarian, and to Janet Baily, administrative assistant of the Vale of Trent faculty. The list will be kept up to date annually and it could be of value to practices whether they have a library or not. It is available from Mrs Janet Baily, Postgraduate Office, Medical School, Queen's Medical Centre, Nottingham NG7 2UH. Cost £2.50 including postage.

Out of hours workload

Sir,

The paper by McCarthy and Bollam on the use of telephone advice for out of hours calls (*January Journal*, p.19) is an interesting description of the situation in north London. However, two factors may limit the wider applicability of the results they report.

The first is the use of 'practices' as the primary denominator for analysis. A review of out of hours care in my own urban practice with 5800 patients revealed a large variation in the use of telephone advice among established general practitioners during 1989 — from 2.9% to 35.5% of all patient contacts made between 18.00 hours and 08.30 hours (total 802). To quote only the overall mean of 16.3% of out of hours patient contacts managed by telephone advice would lose sight of the importance of inter-doctor

variation. Moreover, further analysis of this data reveals that the time of day at which the patient contact was made exerts an additional influence on the doctors' management of the contact. Figure 1 demonstrates three patterns of doctor response to out of hours patient contact seen among the five trained doctors in the practice. The time of day clearly exerts an influence on whether a doctor will visit in response to a patient contact, but this factor appears to influence different doctors in different ways.

Secondly, it would be more helpful to express the management of out of hours calls as a rate per 1000 patients at risk, rather than the number of calls per general practitioner in the practice. This would allow comparison between individual practices as list sizes vary considerably between practices in any one geographical area. Application of regression statistics to my data suggests a close relationship ($P < 0.01$) between the percentage of calls managed by telephone advice and the total number of calls received.

McCarthy and Bollam observe the potential importance of daytime doctor accessibility on the use of out of hours care, a factor previously noted by Livingstone and colleagues.¹ Data from my practice suggest that when no more routine surgery appointments are available at midday, the doctor on call that evening is twice as likely to be disturbed as on days when appointments are available (Table 1). The data presented represent only 156 of 257 possible weekdays during 1989. It is likely that, given a larger data base, an even closer relationship between accessibility and out of hours workload would be demonstrated.

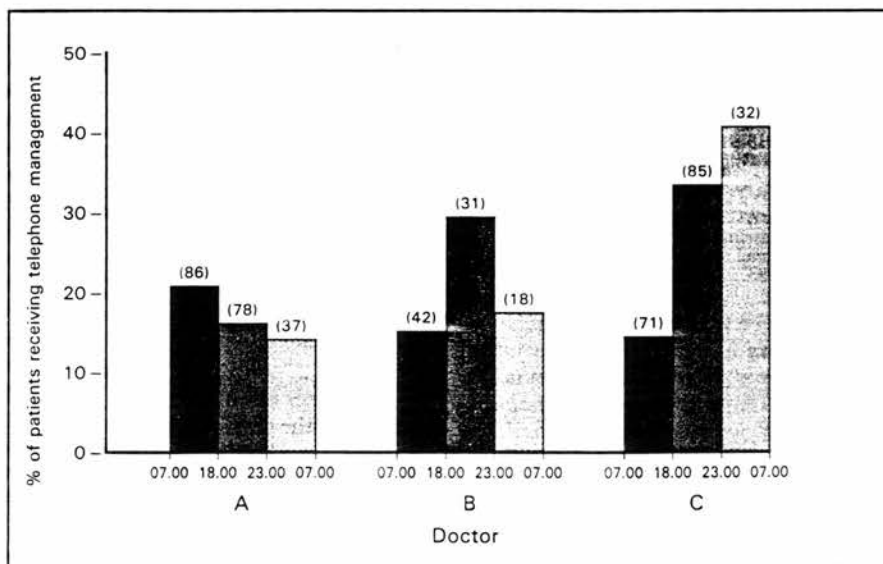


Figure 1. Percentage of patients receiving telephone management by doctor and by time of call. The total number of patients is shown in parentheses at the top of each bar.

Table 1. Relationship between availability of surgery appointments in the afternoon and subsequent out of hours contact for 156 weekdays.

Appointments available at midday	Out of hours contact during following night (no. of days)	
	No	Yes
No	5	44
Yes	24	83

McCarthy and Bollam's conclusion that 'deputy managed calls lead to higher night visiting rates than general practitioner managed calls' is borne out by my figures for 1989. Deputies were employed on 40 occasions in the year when they responded to 93 patient contacts between 18.00 and 08.30 hours. Visiting rates by the deputy doctor (93.5%) compared with the range for established doctors in the practice of 64.5%–97.1% (mean 79.7%, $P < 0.01$, $df = 1$, $\chi^2 = 10.7$) during the same period. Prescribing is another important source of variation in behaviour between doctors. Deputy doctors prescribed antibiotic treatment on 54.5% of occasions where the primary diagnosis was of an upper or lower respiratory tract illness. This compared with the range for established doctors during the same time period (18.00–08.30 hours) of 23.7%–64.0% (mean 43.5%, difference not significant).

Further work needs to be undertaken to identify the factors influencing out of hours workload and, more importantly, to determine at what point the doctor's decision whether to visit becomes a measure of quality of care.

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Reference

- Livingstone AE, Jewell JA, Robson J. Twenty four hour care in inner cities: two years' out of hours workload in east London general practice. *Br Med J* 1989; 299: 368-370.

Voluntary euthanasia

Sir,

I write to express my extreme concern at Dr Bliss's paper on voluntary euthanasia (*March Journal*, p.117). She is of necessity brutally honest about present problems and where these may lead in the not too distant future, but is dishonest in the way she advocates euthanasia.

She is pessimistic in her presuppositions about future resources. The resources available for health and social care are determined by politicians, and decisions can be changed if the nation wills it. Her philosophy is desperately utilitarian, for example, '... how we can redeploy our limited resources to provide the maximum benefit and happiness to the whole population: I submit that individuals matter, that 'happiness' is subjective, and that in any case there may be higher moral values.

I write as a convinced Christian believing that 'the image of God' is in every human being regardless of their physical or mental state, and that that is why all human life is valuable and not for the taking. However, one does not need religion to reject euthanasia. Could any policy be policed adequately? Would there be no abuses? Surely legalized euthanasia would fundamentally and irrevocably alter the doctor-patient relationship? Would there be any incentive to look for different solutions? It is no coincidence that in Holland where euthanasia is performed, perhaps involuntarily, there is very little in the way of a hospice movement.

It is certainly not true that all 'philosophers and theologians agree that there is no real difference between passive and active euthanasia'. Indeed many reject the terms 'passive' and 'active' — so-called 'passive' euthanasia is actually good medical practice, whereas euthanasia is active killing. The difference has been summarized as that between 'mercy-dying' and 'mercy-killing'. Doctors have traditionally respected the difference, and the general public and the law recognize it.

In a way I am grateful that Dr Bliss has painted such a stark picture so that it may challenge the whole nation to meet the real cost of being creative in care when we can no longer cure. I hope that there will now be vigorous discussion so that medicine and society can reject euthanasia once and for all. Killing people does not solve anything.

D A N FERGUSSON

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Sir,

Dr Bliss in her discussion paper made no mention of the conclusions of the British Medical Association working party on euthanasia (1988). This is a surprising omission as the working party had a wide representation of opinion and had spent more than a year studying euthanasia. It concluded that 'The law should not be changed. The deliberate taking of a

human life should remain a crime.'

Dr Bliss details demographic and economic problems. If these are used in support of euthanasia, the argument may be stated quite simply: 'there are too many old, ill or disabled people and we cannot afford to care for them, therefore we kill them.' She describes how Yakuts in Siberia do just this; surely she is not suggesting that we do likewise.

If it was realized that when human life became difficult or expensive to support it could be eliminated, euthanasia would become a common practice. A society permitting euthanasia, which is really a policy of despair, would become a sick society itself. Patients' respect for their doctors would soon be replaced by fear and suspicion; the attitudes of doctors and nurses would harden, and they might even encourage euthanasia for patients posing difficult medical or nursing problems. Families would be divided by guilt and recriminations.

Just down the road from her own Hackney hospital, Dr Bliss will find St Joseph's hospice. The philosophy of hospice care as practised there and at other hospices would provide alternative solutions for many of the difficulties she mentions: relieving distressing symptoms; providing emotional support for patients and their families; enabling the patient to be occupied mentally and physically for as long as possible; allowing a peaceful death with no extraordinary efforts at resuscitation.

It is important to remember that in many cases suffering is on the part of the beholder, not the patient. Human life should be regarded as inviolable. We doctors are practising hippocratic medicine not veterinary medicine.

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Service families

Sir,

The article by Major Vincenti (*February Journal*, p.78) is timely, given the recent dramatic changes in Eastern Europe which will undoubtedly result in redeployment of troops, not only within Europe but in the UK as well. Apart from British troops and their dependants, there are several thousand foreign troops and their dependants in the UK, as part of NATO.

My experience of working for some years with service personnel and their families, both as a serviceman and now as a psychotherapist, confirms the

Changes resulting from increasing appointment length: practical and theoretical issues

J L CAMPBELL

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SUMMARY. *The experience of one urban teaching practice in changing its appointment length from 7.5 to 10.0 minutes is described. Observed benefits to patients attending routine surgeries included an increased consultation time (mean 8.6 minutes before, 9.1 minutes after) and reduced waiting time (mean 19.1 minutes compared with 14.6 minutes). Overall, workload was unchanged but improving the 'fit' between supply and demand was associated with loss of flexibility — a greater number of extra patients required to be seen, apparently because fewer appointments were available at the start of each day. Waiting and consultation times in teaching surgeries and trainee surgeries (booked throughout at 10.0 minute intervals) were unchanged in response to the new arrangements. The changes introduced were well received by medical and reception staff although their response was not formally measured.*

Planning the organization of an appointment system requires several distinct decisions to be made. The preferred or actual average length of consultations has to be decided and booking arrangements designed to enable this to take place without the doctors persistently running over time. The number of appointments per week required to meet anticipated demand has to be calculated on the basis of list size and expected annual consultation rate. However, an exact fit between supply and demand will lead to congestion of the system and it appears that flexibility in the form of an overprovision of appointments to projected demand of about 120% should be built in. Sufficient vacant slots must be provided at the start of each day to allow sufficient flexibility to avoid excessive numbers of patients having to be accommodated. In the practice in which this study was carried out, 85 appointments per 1000 patients per week including 11 unbooked appointments per 1000 patients on a Monday would enable the consultation demands to be met without difficulty.

Keywords: *appointment systems; consultation length; patient waiting time; workload.*

Introduction

MUCH of the recently published work on practice organization has pointed to the advantages of longer as against shorter consultations.¹⁻³ The benefits of adopting a 10 minute booking interval for surgery work have been described^{4,5} and Wilson and colleagues have produced evidence of this change being associated with lower levels of perceived stress among doctors.⁶ Howie and colleagues have demonstrated that mismatch

between preferred working rates and actual booking rates is a major cause of stress, and also that running late, the main consequence of this, is associated with a fall in the quality of care delivered.⁷

Nevertheless, many practices who would like to increase their appointment length to 10 minutes believe this to be impossible because of the extra workload that would follow. There is no recent definition of the ideal number of appointments to meet average demand, although the recent survey carried out for the Department of Health/General Medical Services Committee suggested that the average general practitioner saw 118 patients in the surgery each week.⁸ Neither that report nor any other work-study literature has examined two further key issues, namely day-to-day variation and the amount of flexibility needed to be built into an appointment system to accommodate the extra patients and emergencies that will inevitably occur during routine work.

This paper describes the changes which took place in a university department teaching practice with eight doctors (including one trainee) and 5600 patients (20% of whom attract a deprivation allowance) when it changed from a booking pattern of eight patients per hour to one of six patients per hour. The study practice is atypical in the larger number of doctors seeing patients rather than in the way consultations are organized or conducted. Special arrangements applied to surgeries when students were present ('teaching' surgeries) or where a trainee was consulting and these are described separately.

Method

Using previously described methods of timing patient flow⁹ booking patterns, waiting times and consultation length were noted for all patients seen in the surgery (excluding special clinics) for six weeks before the change of appointment system was made and for the first six weeks thereafter (February–May 1991). Documentation involved the use of synchronized stop watches in reception and consulting rooms. The times at which a patient arrived in the surgery, and the times of the start and end of the consultation were documented. Note was made of the age and sex of patients seen, whether appointments were for new episodes of illness, and whether a prescription was issued, an investigation carried out or a referral made. For each day the number of free appointments at the start of the day was noted, and the extra patients seen were identified. The number of new home visits requested was determined, as was the total number of consultations. The long to short consultation ratio — the percentage of consultations lasting 10 minutes or more divided by the percentage of consultations lasting five minutes or less³ — was calculated for the eight doctors.

In the existing appointment system, surgery length was normally 105 minutes with 14 appointments available for each session (each appointment 7.5 minutes). Occasional double appointments were provided when a problem was anticipated. Extra patients were accommodated during and after the existing appointments as convenient. A total of 35 surgery sessions were provided each week, with eight being scheduled for Mondays. In an emergency, an extra surgery would be provided if required but this was not needed during the six week period. When a student was present, patients were booked at 10.0 minute intervals and the same arrangements applied when a trainee was consulting.

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After the change in appointment system, surgery length was increased to 120 minutes with 12 appointments available for each session (each appointment 10.0 minutes). Extra patients were limited to one at the end of the first hour and one at the end of the second hour of each session. Once again, an extra surgery would be provided if required, but this was not necessary during the six week period. There was no change in the number of weekly surgery sessions arranged or in their distribution. Consultations in which a student or trainee was involved continued to be booked at 10.0 minute intervals.

Results

There were a total of 4523 consultations with general practitioners over the 12 week study period. Of these 303 (7%) were incompletely catalogued and thus not included in all the analyses.

Total workload

A total of 2310 patients were seen in the six weeks prior to change and 2213 in the six weeks after change (which included a holiday Monday when the surgery was closed). The number of consultations at 'teaching' surgeries was 271 before the change and 305 afterwards; the trainee saw 396 and 296 patients, respectively. The nurse saw 672 patients before the change and 678 after it; the home visiting rate decreased from 1.32 per 1000 patients per day to 1.23 per 1000 patients per day. The number of consultations for new episodes of illness was 1075 and 1027 in the two periods and the number of consultations for existing problems 1048 and 1103 (information on the type of consultation was missing for 270 out of the total of 4523 cases). The percentage of consultations for new episodes of illness at teaching surgeries rose from 40.4% to 47.3% compared with a fall from 52.0% to 48.4% for routine surgeries. The number of patients failing to attend for booked appointments was unchanged in the two study periods (mean 31.9 per week before and 38.6 after the change).

Waiting and consultation times

The mean waiting time for patients seen by an experienced general practitioner at routine surgeries fell from 19.1 minutes before the change to 14.6 minutes after it. The mean consultation length increased marginally from 8.6 to 9.1 minutes. The reduced waiting time was observed for all doctors. Changes in consultation length were less consistent — for four out of the seven experienced doctors an increased mean consultation length was observed, two showed a slight decrease and for one the mean consultation length remained unchanged. Waiting and consulta-

tion times remained relatively constant at teaching surgeries (mean of 19.2 minutes before and 19.6 after the change and 10.9 and 11.1 minutes, respectively) and also when the trainee was consulting (mean of 13.9 and 15.6 minutes and 8.5 and 8.4 minutes, respectively). After the change mean waiting times for patients seen towards the end of surgeries were 7.8 minutes per patient less than before the change.

Doctor behaviour

The percentage of consultations at which a prescription was written remained constant (65.1% versus 67.6%) in routine surgeries and rose from 57.6% to 63.8% in teaching surgeries, roughly in line with the increase in the number of patients presenting with new episodes of illness. Before the change, 7.5% of routine consultations were followed by investigation or referral; this rose to 10.2% after the change. The figures in teaching surgeries were 10.0% before and 10.5% after the change. There was a near linear negative correlation (Spearman correlation coefficient -0.81) between prescribing rates and the ratio of long to short consultations for the eight doctors who saw patients during the study.

Supply and demand

Although the number of patients seen remained almost constant (2310/2213), the number of routine appointments available dropped by 12.7% from 2899 to 2532. Thus, the system apparently became more efficient, moving from 79.7% of available appointments filled to 87.4%. In practical terms, this was achieved by a loss of flexibility: a mean of 30.3 appointments available at the start of each day before the change fell to a mean of 17.7 after it, and the difference was greatest on a Monday (63.0 to 43.8) (Table 1). The effect was to move the pressure from Monday to Tuesday and in turn to Wednesday with the result that the mean percentage of appointments filled on a Wednesday increased from 80.6% to 97.1%. The progressive increase in the number of extra patients who had to be fitted into the system as the week progressed peaked on a Thursday when a mean of 17.7 extra patients had to be fitted in after the change compared with 8.5 patients before the change. This extra load was passed on to the following week accounting for part of the loss of available slots at the start of the following Monday.

Subjective reactions

Doctors and reception staff were initially apprehensive about making the change but none would now choose to return to the previous arrangements. There have been some difficulties in

Table 1. Consultation and appointment data before and after changing the appointment length from 7.5 to 10.0 minutes.

	Mean number of:							
	Patients seen		Appointments provided		Free appointments at start of day		Extra patients	
	Before change	After change	Before change	After change	Before change	After change	Before change	After change
Monday	95.5	81.0	115.2	105.6	63.0	43.8	16.3	13.0
Tuesday	77.2	82.8	98.0	92.0	35.2	19.8	12.5	12.2
Wednesday	70.3	75.7	87.2	78.0	18.0	3.8	12.7	17.3
Thursday	68.7	71.3	85.0	78.0	23.5	13.0	8.5	17.7
Friday	73.3	71.5	97.8	86.0	12.0	8.0	12.5	14.3
Total	385.0	382.3	483.2	439.6	—	—	62.5	74.5

giving as many patients an appointment on the same day as they contacted the practice, but the lower waiting times once patients have arrived at the surgery have resulted in a substantially reduced feeling of stress in the reception and waiting area.

Discussion

As this study was carried out between February and May 1991, care should be taken before directly extrapolating the results to a different time of the year. In addition, the socioeconomic mix of the patients registered with the practice, the practice's higher than average doctor to patient ratio and the number of teaching surgeries carried out should also be taken into consideration.

In this practice the mean consultation length before the change of 8.6 minutes exceeded the allotted time of 7.5 minutes, while after the change this imbalance was reversed (consultation length 9.1 minutes; allotted time 10.0 minutes). Given these figures, and the fact that the total number of patients seen remained about the same, the actual time spent consulting remained largely unchanged. The time patients waited in the waiting room fell substantially but although the new consultation length was less than the allotted appointment time, patients still had to wait 15 minutes to be seen.

The change involved making a smaller number of longer appointments available. This had two results. First, fewer planned slots were left unfilled (an apparent increase in efficiency with a higher concordance between supply and demand). Secondly, a loss of booking flexibility resulted and more extra patients had to be accommodated, especially later in the week. Given that the actual length of consultations increased only slightly, it was not perhaps surprising that those aspects of clinical care which were noted remained fairly constant. However, rather more consultations resulted in an investigation or a referral and this may reflect a more comprehensive assessment of patients' problems.

The amount of consultation time required in a practice is a product of the consultation rate per patient per year and the expected length of each consultation. Whether the consultation rate should be taken to be 2.3 per patient per year,¹⁰ 3.8 per patient per year, the figure for the United Kingdom as a whole,⁸ or over four per patient per year, as found in Scotland,¹¹ is a debate beyond the scope of this paper. The evidence in favour of 10 minute consultations is strong, and if longer is better, then self evidently better care takes longer to provide.

The construction of an appointment system required consideration of three elements: demand, efficiency and flexibility. The data presented here project an annual surgery consultation rate of 3.6 consultations per patient per year for the 5600 patients on the practice list. This represents a demand of 69 consultations per 1000 patients per week. This basic figure for demand takes no account of patients who fail to attend or who require double length appointments. In the perfectly managed setting supply and demand should balance exactly but this of course is not possible. In this study, before the change 483 appointments were provided each week while 385 patients were seen (80% efficiency) and after the change the figures were 440 and 382 (87% efficiency). However this increase in efficiency was associated with more patients requiring to be seen as extra patients. Empirically an intermediate figure of about 475 appointments offered per week (85 per 1000 patients per week) would have been optimal: if 382 patients were seen this would represent an efficiency of 80% and an overprovision of appointments to projected demand of about 120%. Flexibility requires appropriate differences in allocation of appointments by weekday. It is essential to provide sufficient vacant appointments to allow expected demand to be largely met on the day requested. In this study the number of free appointments at the start of a Monday was reduced from 63 to 43 with the result that similar loss of vacant appointments accumulated as the week progressed and the number of extra patients having to be accommodated in-

creased. Sixty three free appointments (11 per 1000 patients) would appear to be required on a Monday to prevent the problem of congestion of the system later in the week.

Deciding the total quantity of consulting time required raises issues of both the effectiveness of consulting technique and the quality of care being delivered. Ensuring that booking patterns reflect realistic consulting speeds brings advantages to both doctors and patients in terms of improved patient flow; changing to an efficient 10.0 minute appointment system from an inefficient 7.5 minute system will not necessarily require much new working time.

The planning of an appointment system that works in the interests of patients, reception staff and doctors requires consideration of the separate elements of quality and organization; organization includes the concepts of demand, efficiency and flexibility. A decision has to be made about how long the doctor wishes to spend face-to-face with each patient and booking arrangements should be built around this. The total provision of appointments is based on a prediction of the number of slots required to meet the demand perceived to be appropriate. To do this without running into difficulties requires a modest overprovision of appointments and the guarantee that an adequate number of vacant appointments are available at the start of each working day.

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General Practitioner Appointment Systems, Patient Satisfaction, and use of Accident and Emergency Services—a Study in One Geographical Area

JL CAMPBELL

Campbell JL. General practitioner appointment systems, patient satisfaction, and use of accident and emergency services—a study in one geographical area. *Family Practice* 1994; **11**: 438–445.

This study examines the relationship between (i) measures of how appointment systems work; (ii) patients' views of the arrangements for seeing their general practitioner; and (iii) practice self-referral rates to accident and emergency departments (A&E). Nineteen general practices and one district general hospital A&E department in West Lothian, Scotland formed the setting for a prospective study employing analyses of computerized hospital records, of patients surveys, and of data collected by practices during an 8-week study period in 1993. Principal outcome measures were: (i) measures of appointment system operation corrected for practice list size [number of unbooked ('available') appointments, appointment provision, proportion of patients seen as 'extras']; (ii) patient views on practice appointment systems (reported dissatisfaction with arrangements for being seen, proportion of patients reporting they normally wait in excess of 15 minutes when attending to be seen, the perceived availability of a doctor to deal with (a) urgent and (b) non urgent problems); (iii) practice self-referral rates to local A&E department. Practices varied widely in their rate of provision of appointments, in the proportion of appointments which were unbooked at the start of the working day and in the proportion of patients identified as 'extras' by reception staff. These measures of appointment system operation correlated with patient dissatisfaction with the arrangements of seeing a doctor in their practice and with the perceived availability of a doctor to deal with non urgent problems. The measures did not, however, correlate with A&E self-referral rates after they had been corrected for distance between practice and hospital, or with the perceived availability of a doctor to deal with urgent problems. The proportion of patients seen as extras was related to the proportion of patients reporting they normally waited in excess of 15 minutes to be seen when attending their practice. Practices with small list sizes had fewer respondents reporting dissatisfaction with the arrangements for seeing a doctor than had larger practices. Patients attending A&E reported higher levels of dissatisfaction with the arrangements for seeing their general practitioner than did a sample of patients attending their general practitioner. This finding persisted after attempting to control for case mix, and was true whether patients were referred to A&E by their doctor or self-referred. The crow fly distance between a practice and the hospital is confirmed as an important predictor of use of A&E services by patients who self-refer to such departments. This paper identifies three predictors of patient dissatisfaction with access arrangements for seeing a doctor. These are patients' perceptions of general practitioner availability to deal with non-urgent problems, practice list size, and measures of appointment system operation [the proportion of unbooked ('available') appointments, the rate of provision of appointments, and the proportion of patients identified as 'extras' by reception staff]. Distance between practice and hospital is confirmed as an important predictor of a practice's self-referral rate to A&E. There is no evidence from this study that the variation amongst practices in A&E self-referral rates is related to the operation of general practitioner appointment systems.

INTRODUCTION

Most general practitioners now operate some form of appointments system. Such arrangements are frequently highlighted as a focus for patient dissatisfaction in the UK¹⁻³ and elsewhere.⁴⁻⁶ The working of appointment systems has been the basis for audit⁷ and assessment⁸ and investigations have centred on the functioning of such systems in relation to patient satisfaction,^{5,9} flow (consultation and waiting times¹⁰⁻¹²) and even anger.¹³ An association of a fully booked appointment system with increased out of hours contacts the following night has been shown in one practice.¹⁴

Few studies have suggested how many appointments should be provided, or when. Despite this, standards for dealing with urgent or non-urgent consultation requests have been proposed,¹⁵ and the problem of dealing with urgent demands^{16,17} or with non-attenders^{18,19} within the context of appointment systems explored. The issue of general practitioner availability was raised in the 1990 general practice contract,²⁰ where patient contact time was proposed as a measure of availability. Doctor : patient ratios have been suggested as an alternative measure of availability.²¹

The availability of the general practitioner is a potential influence on attendance at A&E. It has been observed that a majority of accident and emergency (A&E) self-referrals take place when the surgery is likely to be closed (evening, night, or at the weekend),²² although Horder²³ observed that 19% of patients using A&E services had no knowledge of their doctor's surgery hours, and a further 32% had no understanding of the emergency care provided by the practice. Foroughi and Chadwick²⁴ suggested that the number of 'abusers' self-referring to the A&E department was the same on Mondays as on Saturdays and Sundays because "GP surgeries are fully booked unless you care to make an appointment or wait". On the other hand, the Newcastle Accident Survey²⁵ refuted the idea proposed by the Expenditure Committee of the House of Commons²⁶ that "the use of appointment systems . . . can be thought to have some influence on patients' decisions to attend accident and emergency departments".

The aim of the present study was to examine the relationship between measures of how appointment systems work, patients' views of the arrangements for seeing their general practitioner, and practice self-referral rates to A&E.

METHODS

All practices in the West Lothian district of Lothian Health Board were approached in November/December 1992 by letter and personal contact inviting them to contribute to the study. Those agreeing to take part completed a practice profile prior to the start of the study; practices were categorized as small (less than 6000 patients, $n = 9$), medium 6001-10 000 patients, $n = 4$) or large (more than 10 000 patients, $n = 5$). The

'crow fly' distance between a practice and the local district general hospital A&E was calculated using grid references obtained by postcode analysis using the Postzone file extracted from the Central Postcode Directory by OPCS.²⁷

Appointment System Operation

Over an 8-week period from mid February to mid April 1993, participating practices recorded information about their appointment systems and workload on a daily basis. Information was collected at the start of the working day about the number of appointments being offered in routine consulting sessions, and the number still available (i.e. unbooked) at that time. At the end of the working day, information was collected regarding the number of patients seen that day at routine consulting sessions and at special clinics (e.g. antenatal clinics, health promotion clinics) and the numbers of patients consulting who were considered 'extras' was noted. Practices were categorized as having 'low', 'medium' or 'high' ranking for their provision of appointments, number of free appointments at the start of the working day, and for their number of patients seen per day.

Patient Views on Arrangements for Seeing the General Practitioner

During 1 week of the 8-week study period, patients attending participating practices, or A&E, were invited to complete a questionnaire which included questions about their perception of, and satisfaction with, the arrangements for seeing their general practitioner. Responses on the lower 3 points of 5-point scale (very satisfied, satisfied, 50-50, dissatisfied, very dissatisfied) were taken to indicate dissatisfaction. Patients also reported their perceptions about the availability of a doctor from their practice to see them with both urgent or non-urgent problems using a 5-point scale (same day, the day after, 2-7 days later, more than 7 days later, don't know). The percentage of patients reporting that they "normally wait more than 15 minutes to see their doctor" was also calculated for each practice, this being derived from patients' responses to a 6-point waiting time scale (0-5, 5-15, 15-30, 30-45, >45 minutes, don't know).

Patients attending A&E who did not complete a questionnaire at the time were sent a second questionnaire approximately 3 weeks later. The views of patients attending A&E or the general practitioner with problems they described as 'accidents' were analysed separately in an attempt to control for case mix.

Accident and emergency attendance rates

Data were extracted from the computerized record of patients attending the local A&E at St John's Hospital, Livingston New Town. This provided information regarding the demographic features of patients using the service, their registered general practitioner, and the source of their referral to A&E.

Analysis

Data were collated on a main frame computer and analysed using SPSS.²⁸ Groups of individual respondents were compared by chi-squared or Mann-Whitney tests. Simple associations between variables aggregated to the practice level were tested by Spearman rank correlation, while multiple linear regression was used to test associations between dissatisfaction or A&E attendance and possible predictors of these variables.

RESULTS

Nineteen of the 26 practices in West Lothian agreed to collect daily information regarding their appointment systems. Eighteen of the 19 were prepared to distribute questionnaires to patients in the practice. The mean list size for participating practices was 6786 ± 3487 ($n = 19$) and for non-participating practices 5452 ± 3353 ($n = 7$). The combined list size of the participating practices was 128 915 patients.

Throughout the 8-week study period, participating practices saw 67 756 patients in routine and 6002 patients in special clinic consulting sessions, which represented 72 consultations per 1000 registered patients per week. The rate of provision of routine appointments (i.e. not special clinics) and the rate at which patients were seen is shown for individual practices in Figure 1.

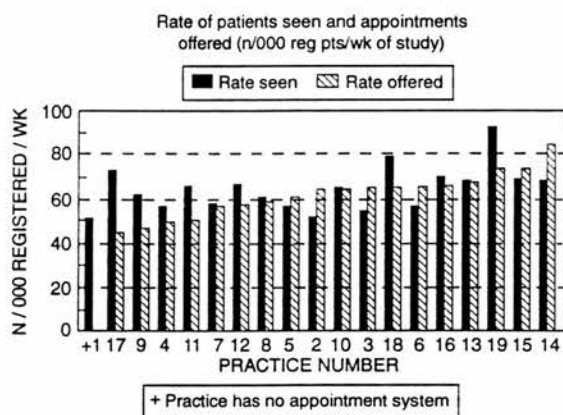


FIGURE 1 Comparison of rates at which patients are seen in routine consulting sessions with rate of appointment provision in such sessions amongst 19 West Lothian practices (average weekly rates per thousand registered patients per week over 8-week study period)

In the 1-week questionnaire survey in 18 practices, 5310 questionnaires were completed, representing an average distribution rate of $66 \pm 21\%$ of total consultations during that week.

Sixty-five per cent (456/699) of new patients attending A&E completed questionnaires, of which 375 were registered with a general practitioner in West Lothian. Forty-eight of the respondents were

registered with a general practitioner outside of West Lothian, and 33 respondents did not identify their general practitioner. Two hundred and thirty-three of the 456 questionnaires were completed at the time of attendance at A&E, and 223 after sending questionnaires to initial non-respondents. The two sets of respondents were similar with respect to age, sex, marital status, employment status and car ownership. They differed however with respect to the patients' referral route (25% vs 45% referred by a doctor or nurse, $P < 0.0001$) and their follow-up at A&E (63% vs 42% being discharged to the care of their general practitioner, $P < 0.0001$; 4% vs 17% requiring admission to hospital, $P < 0.0001$).

The relationship between (i) patient satisfaction with the arrangements for seeing the doctor and (ii) self-referral rates to A&E and two measures of appointment system operation, workload, and practice list size are described in Table 1.

Patient Satisfaction with Access Arrangements to General Practitioners

Twenty-five per cent (1254 out of 5100 valid responses) of West Lothian patients attending their general practitioner were dissatisfied with the arrangements for seeing their general practitioner. Thirty-six per cent (132 out of 371 valid responses) of West Lothian patients attending A&E were dissatisfied with the arrangements for seeing their general practitioner, a figure which varied widely amongst different practices (Figure 2). For those patients attending A&E the dissatisfaction with the arrangements for seeing their general practitioner was independent of whether they were self-referred or not (Table 2).

Amongst patients attending their practice, patient dissatisfaction with the arrangements for seeing the doctor correlated significantly with the following factors after aggregation of the data to practice level (Table 3):

- the three measures of appointment operation,
- the proportion of patients reporting they normally waited in excess of 15 minutes to be seen when attending the surgery,
- the perceived availability of a doctor in the practice to deal with an urgent problem the same day or a non-urgent problem within 2 days,
- practice list size and
- practice self-referral rates to the local A&E.

When these measures were entered in to a multiple regression model, the two measures of perceived availability and the proportion of patients reporting a waiting time in excess of 15 minutes when attending the surgery accounted for 94% of the variance in dissatisfaction between practices.

The association of dissatisfaction with list size was explored further. Patients from larger practices were more likely to report they normally waited in excess of 15 minutes to be seen (44%) compared to medium

TABLE 1 Patient satisfaction with the arrangements for seeing a doctor and A&E self-referral rates in relation to two measures of appointment system functioning, to workload, and to practice list size amongst West Lothian practices

		% Respondents less than 'satisfied' with access arrangements (number of practices ^a)	A&E self-referral rate for practice, n/1000 reg patients/8 weeks (number of practices ^a)
Start of day availability (n free appointments at 08.30 /1000 registered/8 weeks)	Low (<35)	32 (5)	20 (5)
	Med. (35-150)	21 (7)	21 (8)
	High (>150)	14 (5)	25 (5)
Appointment provision (n/1000 registered/8 weeks)	Low (<470)	33 (5)	21 (5)
	Med. (470-530)	20 (7)	21 (8)
	High (>530)	15 (5)	25 (5)
Practice list size (n registered patients)	Small (<6000)	14 (9)	21 (13)
	Med. (6000-10 000)	22 (4)	25 (6)
	Large (>10 000)	36 (5)	16 (7)
Workload— number of consultations at routine surgery sessions (n/1000 registered/8 weeks)	Low (<460)	11 (5)	25 (5)
	Med. (460-530)	29 (8)	21 (9)
	High (>530)	20 (5)	21 (5)

^a The number of practices varies according to the availability of data—whether practices were involved in the study, and if so, to what elements of the study they contributed data (see text).

TABLE 2 Patient-reported satisfaction with their practice's arrangements for seeing the doctor. Responses obtained from 5310 patients from 18 participating (West Lothian) general practices compared with the responses from 375 West Lothian patients attending the local A&E, 141 of whom were referred by a doctor or nurse, 231 of whom were not referred by a doctor or nurse, and three of whom did not record source of referral (not included in table)

	Patients attending general practice	Patients attending accident and emergency	
		Referred by doctor/nurse	Not referred by doctor/nurse
Very satisfied	1997 (38%)	43 (31%)	57 (25%)
Satisfied	1849 (35%)	48 (34%)	89 (39%)
50-50	972 (18%)	37 (26%)	64 (28%)
Dissatisfied	228 (4%)	9 (6%)	14 (6%)
Very dissatisfied	54 (1%)	3 (2%)	4 (2%)
Missing response	210 (4%)	1 (1%)	3 (2%)
Total	5310 (100%)	141 (100%)	231 (100%)

sized or smaller practices (37% and 35%, respectively). There was a significant negative association between practice list size and the perceived availability of a doctor to deal with a non-urgent problem within 2 days (Spearman correlation co-efficient -0.51 , $n = 17$, $p < 0.02$) or with an urgent problem the same day (Spearman correlation co-efficient -0.45 , $n = 17$, $p < 0.04$). Larger practice list sizes were thus associated with poorer *perceived* availability of medical staff, increased dissatisfaction with the arrangements for seeing the doctor, and a longer anticipated waiting time by patients attending the surgery.

TABLE 3 Spearman correlation coefficients for reported dissatisfaction (percentage of questionnaire respondents less than 'satisfied') against the measures of appointment system functioning used in this study, 'perceived availability' for non-urgent and urgent requests, anticipated waiting time, practice list size and practice self-referral rates to A&E

	Spearman coefficient	P
Start of day appointment availability	-0.71	0.001
Appointment provision	-0.54	0.012
Rate of 'extras'	0.67	0.002
Perceived availability		
Non-urgent requests	-0.87	0.000
Urgent requests	-0.64	0.003
Anticipating waiting time in excess of 15 minutes (% patients)	0.48	0.025
List size	0.66	0.002
Practice self-referral rates to A&E	-0.45	0.035

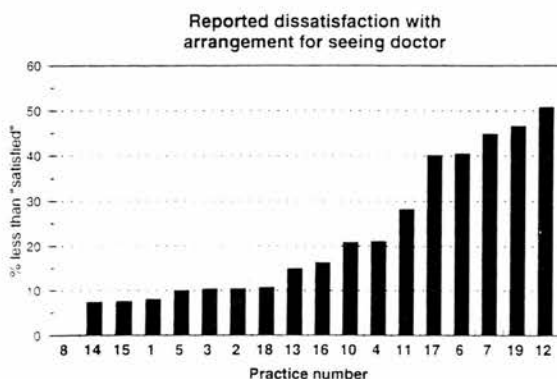


FIGURE 2 Percentage of patients less than 'satisfied' (see text) with the arrangements for seeing a doctor in their practice. Data obtained from 1 week questionnaire survey in each of 18 practices

Accident and Emergency Attendance Rates

Patients registered with general practitioners in West Lothian generated 4849 of the 5684 recorded A&E attendances during the 8-week study period—of these, 3369 (70%) were self-referrals and 1130 (23%) were referred by their general practitioner. The remainder (350, 7%) were referred from other sources—police, school, work, etc. There was wide variation between practices and the average practice self-referral rates, general practitioner referral rates and 'other source' referral rates are summarized in Table 4.

There was a clear negative association between self-referral rates and the distance of the patient's practice from A&E (Figure 3). The outlying case (highlighted) represents the only practice contributing to the study which is served by a single-handed practitioner operating an exclusively 'open access' arrangement for

TABLE 4 A&E attendance rates for 26 practices over 8-week study period by source of referral (self, general practitioner, or other source)

	Referral source		
	Self	GP	'Other'
Rate ^a	20.6 ± 6.7	7.0 ± 2.3	2.3 ± 1.4
Range	4.6–33.2	1.9–12.2	0.2–6.3
n	26	26	26

^a 'Rate' refers to the numbers of patients attending the A&E department per thousand registered patients in the individual practice over the 8-week study period. Rates quoted here are further subdivided by source of referral—either self, general practitioner or 'other'.

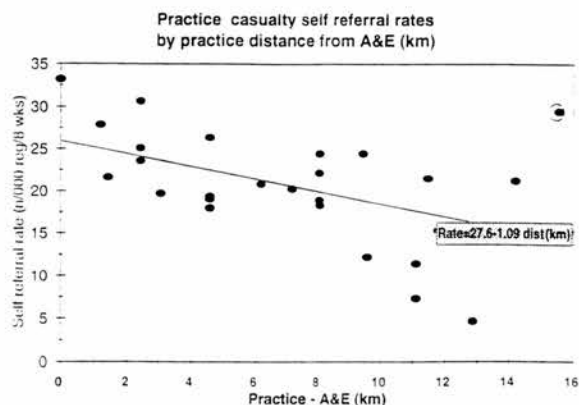


FIGURE 3 Relationship between A&E self-referral rates by patients from 26 West Lothian practices and the 'crow fly' distance between practice and A&E

seeing patients. Excluding this practice from the regression results in an increase in R^2 from 0.24 ($P < 0.01$) to 0.49 ($P < 0.001$). There was no association between general practitioner initiated referral rates to A&E and the distance of the practice from the hospital.

After controlling for case mix, there was no difference observed amongst West Lothian patients who described their problem as an 'accident' who attended A&E (234 and of 375 questionnaires), and those who had 'accidents' but attended their general practitioner (242 out of 4587 valid responses) in either their perception of their general practitioner's appointment system as measured by their estimates of 'normal waiting time' at the surgery (58% vs 61% of patients estimating they normally waited less than 15 minutes) or in their perception of the availability of their doctor to deal with urgent problems (71% of both groups reported they could be seen the same day). A higher proportion of patients with accidents attending A&E expressed some dissatisfaction with the arrangements for seeing their general practitioner (31%) than was the case for similar patients attending their general practitioner (19%).

None of the measures of appointment system functioning used in this study correlated significantly with A&E self-referral rates after adjusting for the distance between the practice and A&E.

DISCUSSION

Method and Generalizability

This prospective study used quantitative information about the structure of general practices, and the operation of their appointment systems, as well as the results of two patient surveys which had been developed in the author's own practice during the study. Overall response rates to the survey were satisfactory.

This study was carried out in West Lothian, a semi-rural area of higher than average socioeconomic deprivation as estimated by traditional measures.²⁹ Nineteen of its 26 practices took part in the study—representing approximately 80% of the patients in the area. Only one practice operated without an appointment system. Practices participating had significantly larger list sizes than those not participating. A pilot study showed that the A&E needs of the practices in this study were largely met by the A&E department on which this study was concentrated.

It was not possible to compare the characteristics of practice attenders who completed questionnaires with those who did not. Attenders at A&E who completed questionnaires were similar with respect to age and sex distribution and source of referral to those who did not complete questionnaires, although the latter group were more likely to be admitted to hospital (and so presumably were more 'ill').

Because the arrangements for seeing patients are general to practices rather than to individual general

practitioners, the main denominator used in this study has been 'the practice'.

Appointment Systems

The early years following the introduction of the general practitioner 'Charter' in 1966 saw a burgeoning in the use of appointment systems, which by 1977 had reached 75% of all practices.² They are often a focus for patient dissatisfaction.^{2,30,31} The wider issue of accessibility of patients to their general practitioner has been the subject of many recent studies in the UK^{15,32-35} and elsewhere.⁴⁻⁶ Most enquiries have focused on the consultation as the key area for research,^{10,11,36-38} although some^{12,39,40} have examined the administrative setting (such as the appointment system) in which the consultations take place.

The measures of appointment system functioning used in this study have been successfully used previously.¹² In this study, the provision of appointments, their availability, and the number of patients seen as 'extras' (all adjusted for practice list size) were all found to be associated with dissatisfaction with the arrangements for seeing a doctor, and with the 'perceived availability' of a doctor to respond to requests for *non-urgent* consultations. However, the operation of the appointment system did not appear to be related to the 'perceived availability' of a doctor to respond to an *urgent* consultation request. Of the three measures of appointment operation, only the proportion of patients seen as 'extras' related to the proportion of patients reporting a normal waiting time in excess of 15 minutes.

The provision of routine appointments and the number of appointments unbooked at the start of the working day varied widely between practices. There was no clear relationship between the number of appointments offered and the actual practice workload subsequently achieved. Practices with a high rate of appointment provision or a high rate of availability of appointments at the start of the working day had a lower proportion of dissatisfied patients than those with low provision or availability. Individual practices accommodate consultation demands in different ways, and it was known that some practices with low routine appointment provision met additional consultation requests entirely by means of an emergency/duty doctor system for example. The two-fold variation in rate of provision of appointments (Figure 1), and the four-fold variation in availability (Table 1) are findings of considerable interest requiring further exploration.

Patient Dissatisfaction

Dissatisfaction amongst patients in general practice has many components, and this study has examined dissatisfaction with the arrangements for seeing a doctor. Five of the practices had 40% or more of respondents reporting dissatisfaction. Ninety-four per cent of the variance in dissatisfaction between practices was explained by the 'perceived availability' of a

doctor to respond to urgent or non-urgent consultation requests and by the proportion of the sample who estimated they normally waited in excess of 15 minutes when attending to be seen. In this study, two-thirds of respondents estimated that they waited less than 15 minutes to be seen, a finding in agreement with Allen *et al.*⁴¹

The association observed between the total list size of a practice or group and dissatisfaction with the arrangements for seeing a doctor is an important finding. However, the multiple regression suggests that, if list size is a causal determinant of dissatisfaction, this is mainly mediated through its effect on 'perceived availability'. The practice with no reported dissatisfaction amongst its questionnaire respondents ($n = 85$) was a single-handed general practitioner who operated a personal list. Patients from larger practices anticipated longer waiting times when attending the doctor than did patients from smaller practices. However, some larger practices did have low levels of dissatisfaction which were comparable with those from smaller practices. This highlights the importance of organizational elements in the functioning of appointment systems and practice administration, which are of particular importance in larger practices.

Accident and Emergency Utilization

Many studies have investigated how patients decide whether they will seek care from their general practitioners, or from A&E. Russell²⁵ identified four variables which he claimed conclusively affected the patients' choice to use hospital-based care: the distance from the family doctor, the distance from the hospital, the diagnosis, and the patient's age. The influence of geographical proximity has been documented in other studies.^{21,42-44} In general, demographic and socio-economic factors have been considered as of only secondary importance in studies where account has also been taken of the potential role of distance as a factor.^{21,25}

Data from this study have demonstrated wide variation in use of A&E services by general practices in West Lothian, with a seven-fold variation in rate of self-referral and an uncorrelated six-fold variation in rate of general practitioner referral. Self-referral rates to A&E varied with the distance of the practice from the hospital although general practitioner-initiated referral rates did not, confirming the importance of distance as a determinant of A&E self-referral but not of general practitioner referral.

There was no difference between patients attending A&E compared with patients attending their general practice in the 'perceived availability' of their general practitioners to deal with urgent consultation requests or in the proportion of patients anticipating a waiting time in excess of 15 minutes. This held true after attempting to control for 'accident' case mix. In addition, practices with low levels of appointment provision or low numbers of unbooked appointments at the

start of the day had similar self-referral rates to A&E as practices with higher provision or availability.

A higher proportion of patients attending A&E were dissatisfied with the arrangements for seeing their general practitioner, and this may be related to difficulty in obtaining appointments.⁷ Whilst one might anticipate that this could be accounted for by discontented patients self-referring to hospital, it is of interest that levels of dissatisfaction were the same in patients referred by their general practitioner. Referred patients (with acute problems) may have had difficulty in seeing the doctor following a 'same day' consultation request, and so record levels of dissatisfaction similar to patients self-referring to A&E.

Appointment systems are a strategy through which general practitioners organize their working day. They are not uniformly popular with patients, and this paper has explored some of the causes and consequences of dissatisfaction which might arise in relation to their operation. The suggestion made by Foroughi and Chadwick²⁴ that general practitioner appointment systems are an important factor in patients' choice of location of care, appears to be more true in terms of patients' perceptions than it is in working reality.

CONCLUSION

This paper identifies three predictors of patient dissatisfaction with access arrangements for seeing a doctor. These are: (i) patients' perceptions of general practitioner availability to deal with non-urgent problems; (ii) practice list size; and (iii) measures of appointment system operation (the number of unbooked appointments at the start of the working day, the rate of provision of appointments, and the proportion of patients identified as 'extras' by reception staff). Distance between practice and hospital is confirmed as an important predictor of a practice's self-referral rate to A&E. There is no evidence from this study that the variation amongst practices in A&E self-referral rates is related to the operation of general practitioner appointment systems.

ACKNOWLEDGEMENTS

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Catchment areas in general practice and their relation to size and quality of practice and deprivation: a descriptive study in one London borough

Clare Jenkins, John Campbell

Abstract

Objective—To relate the sizes of general practice catchment areas in one London borough to list size, deprivation payments, medical staffing, and locally and nationally recognised measures of quality.

Design—Study of general practice catchment area maps.

Setting—London borough of Lambeth.

Subjects—60 out of the 71 general practices in Lambeth.

Main outcome measures—Practice catchment area size with corrections for numbers of doctors and patients.

Results—Catchment area size varied greatly between practices, showing an almost 150-fold difference between the largest and smallest practices. This size differential was even more marked when the size of the catchment area was corrected for the number of general practitioners in the practice, where a 300-fold difference was found. Substantial differences existed between practices in each of the four locally assigned quality bands. The weakest practices had catchment areas three times as large as those of the strongest practices. When corrected for medical staffing, the difference was eight times as great. A calculated measure of patient dispersion showed that the practice population of the strongest practices was four times as densely clustered as that of the weakest practices, whose patients were more widely geographically dispersed.

Conclusions—Large variations exist in the size of catchment areas of inner city practices even when corrected for numbers of doctors and

patients. These differences are associated with variations in quality of care.

Introduction

All NHS general practitioners are required to provide a map of the geographical boundaries of their practices,¹ which should be reproduced in the practice leaflet. While the location of a practice is controlled to some extent by the Medical Practices Committee,² there is no such control over the practice's boundaries. Research interest has tended to focus on administrative characteristics such as list size, partnership size, length of consultation, and staffing and activities such as prescribing and referrals, while the issue of catchment areas has received little attention. General practitioners may set their boundaries wherever they choose, with no legislative constraints and a dearth of published research findings to guide their choice. We performed a study of general practices in one London borough to describe the size of practices' catchment areas and examine the relation between their size and other practice characteristics.

Method

All 71 practices in the London borough of Lambeth were invited to contribute to the study by submitting an up to date map of their catchment areas. Non-responders were followed up by letter, telephone, and visit if necessary. The catchment area boundaries were digitised and catchment area size calculated using the MAPINFO mapping package. Practice location within the borough was classified into three groups—northern, middle, and southern—on the basis of postcode. Further information was obtained from Lambeth,

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Table 1—Catchment area size for 60 general practices in Lambeth

Catchment area size (square miles)	No of practices
≤0.50	10
0.50–0.99	14
1.00–1.49	9
1.50–1.99	10
2.00–2.49	4
2.50–2.99	3
3.00–3.49	3
3.50–3.99	0
4.00–4.49	0
4.50–4.99	1
≥5.00	6

1 square mile = 2.59 km².

Southwark, and Lewisham Family Health Services Authority on total list size, the number of partners and whole time equivalents, the practice's banding status (a four category variable attributed to each practice by the family health services authority after consideration of the range and quality of services offered by the practice, with A indicating the weakest practices and D the strongest³ (see appendix)), fundholding status, the level of deprivation, payment, and patient turnover (the percentage of patients registering with the practice during the year). We also used two prescribing measures: the percentage of all items generically prescribed and the net ingredient cost of items prescribed per ASTRO-PU after excluding four high cost categories of drug (the ASTRO-PU is a measure that weights patients according to their age, sex, and temporary resident status,⁴ and the excluded drugs were dornase alpha, growth hormone, anti-rejection drugs after transplantation, and erythropoietin). These data were analysed using SPSS for Windows, the Kruskal-Wallis test being used to compare variation between the four quality bands.

Three new variables were calculated: by dividing the size of the total practice catchment area by the number of whole time equivalent general practitioners in the practice we obtained a measure of the geographical area nominally covered by each general practitioner (the personal catchment area); by dividing the number of registered patients by the number of whole time equivalent

general practitioners in the practice we obtained the practice personal list size; and by dividing the number of registered patients by the catchment area size we obtained the number of patients registered per square mile of the practice's catchment area, a measure of dispersion.

Results

During the study six singlehanded general practitioners retired and their practices closed. One general practitioner provided medical services only for the residents of a nursing home, and four practices, three in band A and one in band C, had ill defined catchment areas for which they could not provide a detailed map. The remaining 60 practices provided detailed maps, and the data from these practices form the basis of this study.

Practice size overall ranged from 0.19 to 28.27 square miles (0.49–73.3 km²) with a mean of 2.42 square miles (6.27 km²), an almost 150-fold difference. The largest catchment area was more than twice the size of the next largest, and when this value was removed the mean size of the catchment areas of the remaining 59 practices was 1.98 square miles (5.13 km²). Even then, however, there was still a 66-fold difference in size. Overall the catchment areas of 24 practices were less than 1 square mile (2.56 km²), of 43 less than 2 square miles (5.18 km²), and of 54 less than 5 square miles (12.9 km²) (table 1).

Mean catchment area varied with the location of the practice. The mean catchment area of the 22 practices in the north of the borough was 1.45 square miles (3.78 km²), of the 21 in the middle 2.31 square miles (5.98 km²), and of the 17 in the south 3.81 square miles (9.87 km²). When the practice with the extreme catchment area value was removed from this last group, the mean catchment area of the southern practices fell to 2.28 square miles (5.91 km²). Variation in personal catchment area size according to geographical location was small: 1.12, 1.30, and 3.12 (1.54 with the extreme value removed) square miles (2.90, 3.37, 8.08, 3.99 km²) respectively.

Five practices held fundholding status during 1995, of which four were classified as being in quality band D and one in band B. They had a mean catchment area of 1.71 square miles (4.43 km²).

Table 2—Practice characteristics and quality banding for 60 general practices in Lambeth. Data are means, medians, and ranges for practices in each band (median, range)

	Band A	Band B	Band C	Band D	χ ² *
No of practices in band:	8	13	6	33	
Whole time equivalent GPs	1, 1 (1–1)	1.23, 1.0 (1.0–2.0)	1.47, 1.0 (1.0–3.8)	3.07, 3.0 (1.0–7.6)	25.68 P<0.001
Total registered patients	2775, 2881 (1821–3440)	2801, 2876 (1546–3446)	3585, 3068 (2501–6299)	6927, 6088 (1793–18 443)	24.13 P<0.001
Catchment area size (sq miles)	5.48, 1.71 (0.61–28.27)	2.69, 0.92 (0.19–12.57)	2.39, 1.35 (0.28–8.16)	1.58, 1.33 (0.34–5.10)	3.17 P = 0.37
Personal catchment area (sq miles)	5.48, 1.71 (0.61–28.27)	2.07, 0.81 (0.19–9.99)	2.29, 1.35 (0.21–8.16)	0.62, 0.45 (0.09–2.27)	16.03 P<0.001
Patient dispersion (patients per sq mile)	1668, 1482 (102–4690)	3195, 3212 (270–8010)	4609, 2173 (341–14 030)	7399, 4334 (1142–33 686)	13.31 P = 0.004
Personal list size	2775, 2881 (1821–3440)	2452, 2523 (1132–3446)	2812, 2749 (1658–3859)	2308, 2266 (1518–3442)	5.45 P = 0.14
% Patients receiving deprivation payments	68.3, 88.7 (6.6–95.5)	50.5, 46.3 (2.6–95.0)	57.0, 51.3 (26.2–95.6)	66.2, 71.8 (7.0–98.8)	3.75 P = 0.29
% Receiving high deprivation payments	9.9, 2.0 (0–53.6)	1.5, 0.1 (0–7.6)	2.3, 0.6 (0–11.3)	6.5, 0.5 (0–54.2)	1.24 P = 0.75
% Items prescribed generically	51.5, 52.2 (37.4–64.6)	53.1, 58.2 (12.2–74.1)	56.9, 58.1 (42.3–71.7)	56.0, 56.7 (29.9–74.6)	1.72 P = 0.63
Net ingredient cost per ASTRO-PU (£) (excluding high cost items)	15.06, 15.99 (9.94–20.32)	17.29, 17.24 (8.79–30.35)	17.55, 15.52 (12.74–29.63)	17.95, 17.50 (11.32–31.68)	3.17 P = 0.37
% Patients registering in calendar year†	6.1, 6.8 (0–12.7)	10.4, 10.3 (5.4–14.3)	13.3, 14.8 (5.0–17.1)	14.2, † 11.9 (0–58.4)	12.65 P = 0.005

*Kruskal Wallis test used to assess variation between the four quality bands.

†Data unavailable for one practice.

1 square mile = 2.59 km².

Personal catchment area size ranged from 0.09 square miles (0.23 km²) per general practitioner to 28.27 square miles (73.2 km²) with a mean of 1.75 square miles (4.53 km²), a 314-fold difference. Again, even when the extreme value was omitted, there was still an 111-fold variation in this variable. Overall, 39 practices had personal catchment areas of less than 1 square mile, 52 of less than 2, and 55 of less than 5.

The number of patients registered with the practices ranged from 1546 to 18 443, with a mean of 5145. Practice personal lists ranged from 1132 to 3859 with a mean of 2452.

The number of patients per square mile ranged from 102 to 33 686 patients, with a mean of 5445, representing a 330-fold variation in patient dispersion between the practices.

The 60 practices were unequally distributed among the four banding levels (table 2), with 33 practices being in band D, 6 in band C, 13 in band B, and 8 in band A. A size gradient was clearly visible, with practices in band A having average catchment areas more than three times as large as those of practices in band D. These differences were even more pronounced when personal catchment area size was considered, with practices in band A having areas more than eight times as large as those in band D. Mean practice personal list sizes varied less between the bands, but practices in band D had smaller personal lists on average than those in any of the three other bands. The measure of patient dispersion showed a marked gradient between bands, with patients in band A practices being more than four times more widely scattered geographically than those of practices in band D. Deprivation payments were payable for more patients in band A practices on average than in any of the three other bands, although the figure for band D practices was only slightly lower. The proportion of prescription items prescribed generically was lowest on average in the band A practices, as was the net ingredient cost per ASTRO-PU. The number of new patients registering with the practice during the previous calendar year as a proportion of the total list size showed a gradient between bands, with those in the weakest practices registering proportionally fewer patients on average than those in any of the other bands.

Discussion

The geographical area over which the general practitioner contracts to provide medical services is important to both patients and doctors. For patients, accessibility of services is a major factor influencing their choice of practice³⁻⁷ and use of its services.^{8,9} The advantages of being registered with a local general practitioner include reduced travelling time to the surgery, being within the area of responsibility of local care teams, and not losing out to "more distant but mobile patients."¹⁰ However, when they move home some patients prefer to maintain links with a practice they know even though they may have to travel further.¹¹ For general practitioners, increased travelling time to attend home visits and the problems of coordinating their use of services and making referrals in areas distant from the practice may prove problematic.

We found that catchment areas varied widely: while some practices operated very small catchment areas, others had patient populations that were widely scattered. We cannot say with any certainty why these wide differences existed because we did not examine the administrative and historical reasons why practices had particular catchment areas. Possibly weaker practices need to "cast the net" wider as a result of financial constraints, while stronger practices can fulfil their capitation requirements by drawing their practice population from within a few streets of the surgery. The size

Key messages

- All general practitioners are required to define their practice catchment areas
- The organisation and distribution of catchment areas in general practice have received little attention
- Data from general practices in one inner London borough were used to investigate the relation between catchment area size and a range of practice characteristics.
- The variation in size of catchment areas between practices was large, even when corrected for medical staffing and practice list size
- An inverse relation was reported between the quality of service provision and the size of the catchment area

of the catchment area appeared to be related both to location within the borough and to fundholding status, although the differences we observed were not great. We plan to undertake further work with a sample of practices to explore qualitatively the issues surrounding the setting up and operation of catchment area policies.

Our study was based on catchment area maps provided by the practices themselves. While the maps are likely to reflect current practice policy, a practice's patients may be more or less widely scattered than the map suggests. Clearly, also, actual patient location may be unrelated to the dispersion we calculated, but our measure does give an initial indication of the practice population density. We plan further work investigating the extent to which the distribution of the practice population relates to the stated catchment area.

The literature relating to geographical location and accessibility of general practitioner services suggests that there is an "inverse care law" effect in the location of surgery premises, these being less likely to be located in areas where need may be greatest.¹² Accessibility is also reported to decline at increasing distances from the surgery.¹³ In this study weaker practices, which had higher levels of deprivation payments than stronger practices, tended to have larger catchment areas and more widely dispersed populations. The patients of these practices will therefore probably have greater distances to travel to the surgery and be more socially deprived than patients in other practices.

Several family health services authorities are developing performance indicators to measure aspects of practice activity.¹⁴ The quality banding measure we used in this study was set up in Lambeth, Southwark, and Lewisham by the family health services authority in cooperation with the local medical committee. Used to determine staffing budgets and as a management technique to improve the quality of services provided locally, the initial banding was based on questionnaire returns from each practice. Rebanding takes place continuously using information gathered from the practice and in house data, such as those produced for target payments.

We have failed to find other studies that have mapped and measured catchment areas in general practice. As a result, we cannot comment on the relevance of our results to other locations. The issue of catchment areas in general practice, particularly in the inner city, is complex, with large numbers of practices providing their services over small geographical areas.¹⁵ While it has been suggested that a rationalisation of catchment areas in general practice might be more practical and cost effective,¹⁶ such a move is likely to compromise patient choice.

The size of the differences we observed was surprising and, along with the inverse relation we have described between quality of service provision and practice catchment area, suggests that the time may have come to re-examine the geographical distribution of general medical practices. Optimal practice list size has not yet been defined, although larger practice lists have been suggested to be disadvantageous to patients.¹⁷ Larger practice catchment areas may also be associated with disadvantages to patient care, and further research is needed into this neglected but important area of health care planning.

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Conflict of interest: None.

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Appendix—Services and quality indicators for practices in each band³

Band A: practices providing a basic service

Patient registration
 Appropriate personal general medical services to all registered patients
 Prescribing and system for repeat prescribing
 Arrangements for out of hours cover
 Over 75 health check
 Fulfil availability requirements
 Approved premises
 Suitably qualified staff, job descriptions, and contracts
 Agreed practice area
 Adequate medical record keeping
 Appropriate certification
 Practice leaflet
 Participation in training

Band B: practices providing a normal service

All services provided in band A
 Ensure patients have access to child health surveillance services
 Maternity medical services
 Contraceptive services
 Health promotion band 1
 Practice nurse
 Partnership agreement

Band C: practices providing a full range of services

All services provided in bands A and B
 Child health surveillance services
 Minor surgery
 Health promotion band 2
 Achieve 50% target for cervical screening
 Achieve 70% target for vaccinations and immunisations
 Partial computerisation
 Meet health and safety requirements
 Participation in audit
 Regular team meetings

Band D: practices providing an extended range of services

All services provided in bands A, B, and C
 Health promotion band 3
 Practice based complaints procedure
 Staff development plans
 Achieve 80% target for cervical screening
 Achieve 90% target for vaccinations and immunisations
 Service development plan
 Needs assessment and service audit
 Written prescribing policy
 Teaching and training
 Service innovation and development



The reported availability of general practitioners and the influence of practice list size

J L CAMPBELL

SUMMARY

Background. Combined practice list sizes have increased, but larger practice size may be associated with disadvantage to patients.

Aim. The aim of the study was to investigate the availability of general practitioners as reported by their patients and the relationship between reported availability and practice list size.

Method. A one-week questionnaire survey of 8315 patients attending participating practices in West Lothian, Scotland, was conducted. Patients were asked about the arrangements for being seen at that attendance, their perception of doctor availability following an urgent or non-urgent consultation request, and their social and demographic characteristics. The proportion of respondents reporting they could see a doctor the same day following an urgent consultation request or within 2 days following a non-urgent consultation request was determined for each practice.

Results. Eighteen out of 26 practices agreed to participate in the study, and an overall response rate of 61% was obtained in the patient survey. Participating practices were representative of all practices in the area with regard to list size; questionnaire respondents were representative of the age profile of participating practices and were representative of the local general population with regard to car and home ownership. There was a wide variation among practices in the proportion of questionnaire respondents who reported that a doctor was available within 2 days following a non-urgent consultation request (mean 60.7 (SE 7.1%)), but less variation for the reported availability on the same day after an urgent consultation request (mean 81.1 (SE 2.3 %)). A significant negative association was demonstrated between combined practice list size and reported non-urgent or urgent availability.

Conclusion. Wide variation exists between practices with regard to patients' perceptions of doctor availability, and smaller practices may have advantages in this regard. The feelings and perceptions of patients should be taken into account when planning or reviewing the delivery of primary health care.

Keywords: appointment systems; workload; list size; practice organization; patient perceptions.

Introduction

SINCE the General Practice Charter of 1965, general practitioners have been encouraged to practise in groups as these seem to offer economies of scale and the most efficient means of delivering care to the population. Practice sizes have continued to increase:¹ between 1950 and 1990, the proportion of unre-

stricted principals working in practices with a list size of more than 7500 patients rose from 24 to 56%.

However, large list sizes are not without problems, most notably in relation to continuity of care² and access to medical services. Continuity may be addressed by such measures as improved record keeping, but issues of access may be more difficult to overcome. Consumer organizations³ and government⁴ continue to comment on the difficulty reported by patients in arranging to see their general practitioner, and there is evidence^{5,6} that patients from larger practices are less satisfied with the arrangements for seeing a doctor than those from smaller practices.

This study investigates the availability of general practitioners as reported by their patients and the relationship between reported availability and practice list size.

Method

All 26 general practices in West Lothian, Scotland, were invited to contribute to a study with the above aim. All agreed to give information about their list size, and 18 agreed to provide information regarding their medical staffing arrangements and distribute questionnaires to each patient attending the doctor during a one-week period. Adults attending with children aged less than 16 years completed questionnaires on their behalf. Respondents were asked their date of birth and about how soon they thought they could be seen by 'a doctor from their practice' following an urgent or non-urgent appointment request (asked separately). Responses were obtained using a five-point scale (same day, day after, 2-7 days later, more than 7 days later, don't know). Information obtained from patients was aggregated to practice level, with 'don't know' responses being excluded from the analysis. A target availability of patients being seen the same day for urgent problems and within 2 days for non-urgent problems was adopted. The percentage of the questionnaire respondents reporting that their practice achieved these targets was determined for each practice.

Respondents were also asked about the arrangements for their current attendance at the practice — whether an appointment had been made in advance (and if so, whether this was for the day they wanted), or whether they had been advised to 'come and wait,' or had simply presented, hoping to be seen. The one practice with no appointment system was excluded from this analysis; for the 17 other practices, the percentage of patients reporting they had received an appointment for the day they wished was determined, and this was related to the percentage of the questionnaire sample reporting that their practice achieved the availability targets.

Questionnaire respondents were asked about whether they owned or had access to a car and whether they were living in council rented accommodation. In order to help clarify whether the sample of respondents was representative of the local population, information obtained was compared with equivalent data from the 1991 census for the 20 postcode sectors of West Lothian. The proportions of those under 5 and over 65 years of age in the questionnaire survey were compared with the proportions in the combined practice lists for the 17 practices contributing to the questionnaire survey.

Data obtained were analysed using the SPSS.⁷ Simple associa-

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tions between variables aggregated to the practice level were examined by Spearman rank correlation coefficients or Pearson correlation coefficients.

The two-tailed significance of Pearson partial correlation moment values was calculated when correcting for questionnaire response rates. Practice list sizes were compared using Student's *t*-test. Analysis of variance was used to compare the ages of respondents in each of the response categories when questioned regarding doctor availability.

Results

The 18 participating practices had a mean list size of 6469 patients (range 1596–11 478), compared with 6333 (range 1779–12 490) for non-participating practices (difference not significant, $P=0.93$); all but one of the 18 practices operated an appointment system. The average number of medical full-time equivalents (excluding locums and trainees) was 3.9 ± 0.5 (SE) per practice, and the average list per medical full-time equivalent was 1787 ± 107 (SE) patients. During the one-week study period, participating practices saw 8315 patients, of whom 5094 completed questionnaires were obtained (average practice response rate 61%, range 36–97%). There was no significant association between practice list size and questionnaire response rate. Respondents were similar to the general population of West Lothian with regard to car and home ownership (68% versus 63% car ownership, 47% versus 46% local authority accommodation) and the combined age profile of participating practices (4.7% versus 5.8% aged <5 years; 6.9% versus 8.5% aged >65 years). There was a significant difference between practices in the mean age of respondent [36.7 ± 18.7 years (SD), range 34.0–42.6 years for 18 practices, $F=3.8$, $P<0.0001$]. The age of the respondent, however, was not a predictor of their perception of doctor availability for urgent ($\eta=0.04$, $P=0.29$) or non-urgent ($\eta=0.04$, $P=0.22$) appointment requests.

Out of 5094 questionnaire respondents, 4999 (98%) were from practices operating an appointments system; of these, 4535 (94%) had been given a specific appointment time, 210 (4%) had been advised to 'come and wait' and 83 (2%) had arrived unannounced (171 missing responses). Appointments had been given for the day requested to 3558 (80%) patients (range for 17 practices 70–95%) and 'not for the day requested' to a further 872 (20%) patients (105 missing responses).

The percentage of questionnaire respondents reporting that their practice met the targets for doctor availability is presented in Figure 1. The results show considerable variation among the 18 practices in the reported availability for non-urgent problems [mean $60.7\pm 7.1\%$ (SE) of the sample reporting they could be seen within 2 days], but less variation for urgent problems [mean $81.1\pm 2.3\%$ (SE) of the sample reporting they could be seen the same day].

The association of practice list size with the reported availability of a doctor to deal with urgent requests the same day, or non-urgent appointment requests within 2 days is presented in Figures 2 and 3. There was a statistically significant negative association between list size and the percentage of respondents reporting that the practice achieved the predefined target for availability for urgent problems (Pearson correlation coefficient $r=0.62$, $P=0.006$) and non-urgent problems (Pearson $r=0.53$, $P=0.03$). Correcting for varying response rates did not alter this association substantially (urgent, Pearson partial correlation moment $r=0.61$, $P=0.009$; non-urgent, $r=0.53$, $P=0.03$). There was no association between practices' average number of patients per whole-time equivalent doctor and their patients' perceptions of doctor availability in either the urgent ($r=0.34$, $P=0.16$) or the non-urgent ($r=0.25$, $P=0.31$) situation.

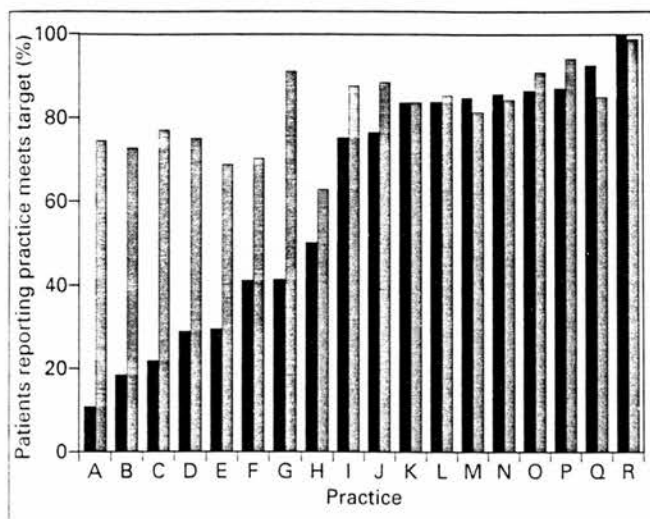


Figure 1. Perceived doctor availability. Percentage of patients reporting practice meets target for urgent (□) or non-urgent (■) availability.

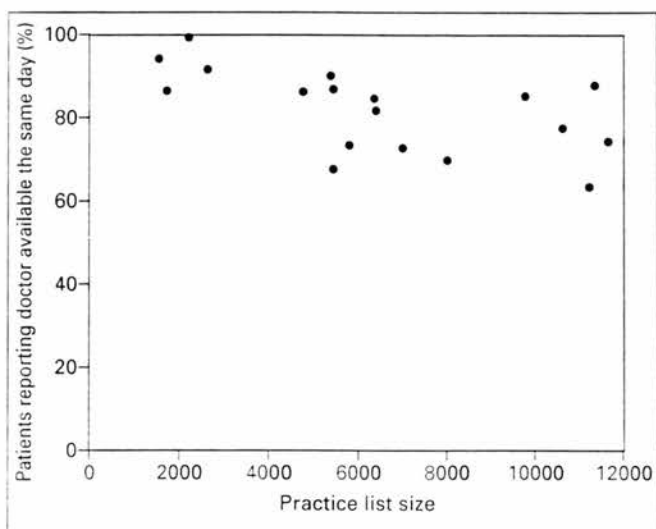


Figure 2. List size and perceived doctor availability the same day for urgent appointment requests.

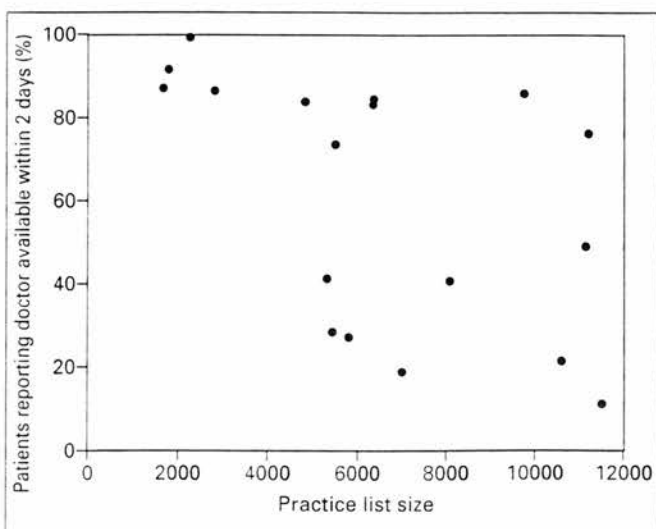


Figure 3. List size and perceived doctor availability within 2 days for non-urgent appointment requests.

There was a significant association between the percentage of the questionnaire respondents in each practice reporting they had received an appointment for the day they had requested and the percentage reporting a practice's perceived attainment of target times for availability for both urgent and non-urgent appointment requests (urgent, Pearson $r=0.75$, $P<0.001$; non-urgent, Pearson $r=0.84$, $P<0.0001$).

Discussion

Participating practices were representative of all practices in West Lothian with regard to list size, and the one-week questionnaire survey carried out in these practices gave a satisfactory overall response rate. Respondents completing the questionnaire were similar to the local general population with regard to car and home ownership, and a comparison of age profiles demonstrated that the sample of respondents had a similar age profile to that of participating practices.

Variation in perceived availability

Using a standard previously adopted when considering doctor availability,⁸ a 10-fold variation in doctor availability for non-urgent problems was reported by patients from 18 different practices. This is a substantial variation, with potentially important implications for decisions taken by patients as to whether, where, when and whom to consult. Previous work⁵ has suggested that patients attending accident and emergency departments are less satisfied with the arrangements for seeing their doctor than patients attending their general practitioners, and that this dissatisfaction is significantly associated with poorer perceptions of general practitioner availability. It would be of interest to explore the possibility that patients with poorer perceptions of general practitioner availability might also make greater use of general practitioner out-of-hours services than those with a better view of general practitioner availability.

Despite the wide variations between practices in perceived doctor availability, an overall average of 81% of patients reported they could usually get an appointment within 24 h of an urgent request, a figure rather more than that reported by Cartwright and Anderson⁹ (63%) or Ritchie *et al*¹⁰ (45%). Both of these studies involved interviewing a random stratified sample of adult patients identified from the electoral register compared with a sample of patients consulting the doctor in this study. Study design may thus account for some of the difference. In this study, 80% of questionnaire respondents stated they had received an appointment for the day they wanted and there was a close association between practices' reported ability to provide such an arrangement and the reported availability of a doctor in the urgent or non-urgent situation. This association was taken to reflect a good degree of internal consistency in these items of the questionnaire. A more formal validation of the questions is planned.

List size and perceived availability

This study has demonstrated a significant negative association between practice list size and the perceived availability of a doctor to deal with urgent or non-urgent consultation requests. It is perhaps surprising that this relationship is so marked for perceived availability for urgent problems — one might have anticipated this to be independent of list size and to be determined mainly by 'clinical' factors. The findings of this study offer further support to the suggestion that smaller practice list sizes have advantages with regard to patients' perceptions of their doctor's availability. Butler and Calnan⁸ have previously reported findings from a survey of 1300 general practitioners and observed

that 'with increasing list size, doctors were more likely to feel that patients should be able to get an appointment with any doctor on the same day, and were also more likely to report that patients in their own practices would be able to do so'. Their study used mean personal list size rather than practice list size, and relied on doctors' reports rather than patients'. Another study,¹¹ surveying doctors from 245 out of 267 practices in the south-west of England, reported that 80% of practices claimed to be offering a non-urgent appointment to patients on the same or the next day. This finding, obtained from doctors' reports, is at odds with the reports of the patients in this study, in which only 61% thought they could be seen on the same or next day after a non-urgent consultation request. These earlier studies were carried out in different parts of the country, and the socioeconomic characteristics of the practices contributing to the studies cannot be readily compared. Despite this, the apparent discrepancy between doctors' and patients' perceptions of availability would appear to warrant further study.

In this study, there was no association between list size corrected for the numbers of doctors in the practice and patients' perceptions of doctor availability. In the presence of an association between uncorrected list size and perceived availability, this suggests that any such association is independent of medical staffing levels. It is possible that the differences in perceptions described in this study might reflect varying expectations for delivery of care among patients from different-sized practices, rather than real differences in availability of services. Alternative explanations for the observed association might include a less personal approach to care perceived by patients in larger practices, some element of receptionist operation or greater administrative flexibility in smaller practices which might require less rigid administrative procedures. Freeman and Richards⁵ have observed that patients receiving more personal continuity of care were likely to have booked their most recent appointment further in advance than patients receiving less personal continuity; they also highlighted the difficulties inherent in providing both personal continuity of care and freedom of choice for patients. The relationships between practice size, perceived doctor availability and administrative flexibility is a potentially interesting area, and further work is planned to explore these possibilities.

List size has been demonstrated to be negatively associated with consultation length,^{8,12} but Butler and Calnan's detailed study of list sizes concluded that, whereas smaller list sizes might result in advantages to patient care (e.g. through longer consultation length), the evidence examined suggested that not all the potential time advantage gained through smaller list and practice sizes would be passed on to patients. In the light of that observation, it is not possible to predict the likely impact of reducing practice size on patients' perceptions of doctor accessibility without careful consideration of other factors that may also be operating.

Practice organization is of importance in days when the process of care is influenced by the need to achieve targets. Distinction should be drawn between the 'availability' of services and their 'accessibility'. The former suggests simply provision of a service, the latter relates more to the perception of that service by the user and the ease with which that user might avail themselves of the service. The 'distance between general practitioners and their patients'¹³ may not simply be a geographical one, and the more intangible feelings and perceptions of patients should be accounted for when considering changes in practice organization. This study suggests that smaller practices have advantages with regard to patients' perceptions of doctor availability. The pressure to increase practice size on administrative

and financial grounds may ultimately prove to be disadvantageous to patient expectations and desires. Government and health service managers would be advised to take account of available information on practice list size before perpetuating this trend.

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MEASURING ACCESS TO PRIMARY MEDICAL CARE -

Some examples of the use of Geographical Information Systems

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Abstract

This paper explores the potential for Geographical Information System technology in defining some variables influencing the use of primary care medical services. Eighteen general practices in Scotland contributed to a study examining the accessibility of their services and their patients' use of the local Accident and Emergency Department. Geo-referencing of information was carried out through analysis of postcode data relating to practices and patients. This information was analysed using ARC/INFO GIS software in conjunction with the ORACLE relational database and 1991 census information. The results demonstrate that GIS technology has an important role in defining and analysing the use of health services by the population.

Title: Access to primary medical care - Are geographical information Systems a useful investigative tool?

Introduction

The provision of Health Care in the United Kingdom has undergone many changes in recent years, the most recent substantial change being the separation of purchaser and provider functions and the creation of the internal market for health in April 1991. Increased importance has been placed on identifying present and future health needs of the population as a more market based approach to health care has been adopted. Commissioning and purchasing authorities require a clear understanding of the health needs and behaviour of the population in order that they may procure the most appropriate services. Previous studies have examined the relationship of patients using both primary (Knox, 1979; Joseph and Bantock, 1982) and secondary (Joseph and Phillips, 1984) care services and emphasis has been placed on those factors which influence patients accessibility to health services. Accessibility can be judged in both socio-organisational and geographical terms (Joseph and Phillips, 1984) with patterns of utilisation of health services generally being viewed as a manifestation of accessibility (Hayes et al. 1990; Phillips, 1979). Utilisation of health services has been found to vary with such factors as distance (Ingram et al. 1978) and the age, sex and income of patients (Joseph and Poyner, 1982; Fiedler, 1981).

There is an inherently spatial component to many of these information needs which should be considered when analysing health needs and patient behaviour. The significance of this remains to be fully recognised, at least in the United Kingdom. Not only must attitudes and organisational structures change to meet with the present information requirements, but more powerful analytical tools must also be utilised. Geographical information systems (GIS), with their powerful database and display functions allow for the integration of data from numerous sources and the performance of detailed analysis taking into consideration the location of the variables in question - whether patients, services, or social and economic variables which might be of relevance. As such, GIS lends itself well to health related studies. To date however, this technology has been explored in only a limited way in the health arena (Lovett, 1992) although this present Journal has recently been published and is devoted to examining the issues of "Health and Place".

Early applications of GIS in the health field focused on epidemiological issues (Nicol, 1991; Matthews, 1991; Dunn, 1992; Glass, 1991) - the "distribution and determinants of health and disease in groups" (Sackett et al. 1991); more recently GIS has been applied to the planning and management of health care services - applications ranging from the creation of health profiles (Curtis, 1989; Kivell and Mason, 1992; Bloemberg and Doornbass, 1992) to the location of service centres (Dowie et al. 1995; Clarke, 1992; Morgan, 1990) and route planning.

In order to explore the potential benefits of GIS technology in the health care field, a detailed case study was performed employing GIS software and methods. The study, investigating issues of accessibility of primary care in West Lothian, Scotland, was completed as part of a larger project (previously reported (Campbell, 1994)) examining the determinants of accessibility of primary care medical services provided either by the general practitioner or the accident and emergency department (AED). Knox (Knox, 1978) has demonstrated the increasing use of Accident and

Emergency services by patients who have limited access to general practitioner services; in these situations Accident and Emergency departments may be viewed as providing a surrogate for general practitioner services.

Method

All twenty-six general medical practices in West Lothian, Scotland (Figure 1) were invited to participate in a study examining the relationship between the operation of general practitioner appointment systems and patients' use of Accident and Emergency services. All agreed to provide information regarding the practice size and practice postcode. Eighteen also agreed to contribute to a larger study (Campbell, 1994) examining the performance of any appointment systems they might operate. As part of this study, all patients attending their general practitioner during a one week period were invited to complete a questionnaire. Information was obtained on the patient's home postcode, their means of travel to the practice, and their perceptions of the accessibility of local medical services. Responses were obtained using a five point scale for estimated travel time (<15 mins, 15-30 min, 30-45 min, 45-60 mins, >60 mins) and four point scale for estimated travel distance (<1 mile, 1-2 miles, 2-5 miles, >5 miles). Information regarding postcodes and source of referral was also obtained from data capture of the computerised medical record of all patients attending the local Accident and Emergency department during a concurrent eight week period.

Postcode data obtained for patients and practices was geo-referenced using the POSTZON programme (Colchester:ESRC Data Archive, 1988) to assign five digit national grid co-ordinates to each record. Geo-referencing of postcode data permitted mapping of this information on digital map files of roads and geographic boundaries obtained from the University of Edinburgh Department of Geography. The majority of the attribute data was held within the ORACLE relational database management system which was linked to the GIS software ARC/INFO.

A variety of GIS techniques were selected for analysis of the data. These ranged from simple querying and display to more complicated techniques designed to evaluate such issues as (i) straight line and network distances (i.e. distances which take into consideration the road network over which people must travel) between the patients home and the service centre (ii) the effect of distance on the utilisation of services, (iii) the overall accessibility of those services, and (iv) patterns of patients' utilisation and perception of service accessibility.

Network distances were calculated using the network functions within ARC/INFO and the ability of the software to assign each patient to their closest road segment. The effect of distance on the use of AED services was investigated by using buffer and convex hull techniques^a to create straight line and network distance rings at consistent intervals centred on the AED. Geo-referencing of postcodes permitted allocation of patients to one of five buffer zones (0-2km, 2-4km, 4-6km, 6-8km, 8-10km)

^a "Buffer": "an area of specified width drawn around one or more map elements" (Aronoff, 1991).
"Convex Hull": an area created by joining the outermost points related to a particular criteria - in this case the point on each road segment which represents a pre-defined distance from a central point

depending on their straight line or network distances (calculated separately) from the Accident and Emergency department. Spatial overlays were performed in order to calculate both the number of patients and the total number of people (derived from 1991 census information) within each ring, thus allowing comparison between the rings of the percentage of the population self referring to AED in the eight week study period.

Integration with 1991 postcode level census data permitted calculation of Jarman's Underprivileged Area Scores (UPA) (Jarman, 1983) for the twenty postcode sectors of West Lothian, and provided information on car and home ownership. This measure was originally developed as an attempt to predict geographical areas with socio-economic characteristics associated with increased general practitioner workload. The UPA score was examined as one variable potentially explaining the use of Accident and Emergency services.

In order to gain an insight into patients' decision-making with regard to choice of practice, and in order to illustrate the display functions possible in a GIS, spider graphs (ie straight lines connecting peripheral points to a central point) were drawn for four randomly selected practices using the geo-referenced postcodes for the practices (centrally) and the patients home addresses (peripherally). Thiessen polygons^a were drawn for each of the practices in West Lothian in order to determine whether or not patients attended their closest practice. Because the point coverage boundaries of the polygon did not match the boundaries of West Lothian, the calculated boundaries for peripheral polygons were edited manually, and clipped to the boundaries of West Lothian.

Results

During the one week study period 8005 patients were seen at routine consulting sessions in the eighteen participating practices. Questionnaires were completed in respect of 5,283 (66%) of these - postcodes that could be georeferenced were obtained from 3,931 (74%) of these patients compared with 4,255 of the 5,685 (75%) patients recorded on the hospital computer as attending Accident and Emergency in the eight week study period.

Accident and Emergency Utilisation

A distance decay effect was evident in the pattern of patients self-referral for Accident and Emergency care (Figure 2) - that is, use of the service decreases with the patients' distance from the hospital. Figure 3 demonstrates a similar effect using network distances. Comparison of equivalent distance buffers between the two figures reveals the distortion of the buffer which take place when network distance is used rather than straight-line distance.

Figure 4 highlights a four-fold variation between the twenty postcode sectors in West Lothian in self referral rates for Accident and Emergency care over the eight week study period. Such a variation begs an explanation, and we have been able to investigate the potential socio-economic influences on these discrepancies by mapping

^a polygons defining an area where all locations in the polygon are nearer to the defining point (in this case the practice) than any other

car and home ownership information (Figures 5, 6) and Jarmans UPA score (Figure 7) for these postcode sectors. One postcode sector immediately west of the AED sector had an unusually low rate of self referral for AED care despite its geographical proximity. Inspection of Figures 5, 6 and 7 demonstrate that this is a sector with higher than average rates of car and home ownership, and with a low UPA score when compared with the other postcode sectors in West Lothian. It would appear that sectors with lower Accident and Emergency usage may be those with lower socio-economic deprivation as evidenced by lower UPA scores and increased car/home ownership.

Utilisation of General Practitioner Services

The distribution of the home postcodes of patients attending four practices in West Lothian is demonstrated in Figure 8. It can be seen that whilst the majority of patients choose medical practices near their home address, many patients do not elect to receive medical services from the practice which is geographically closest to their home address. The average straight line distance travelled to general practitioner surgeries was 1.23 km. However, through the use of Thiessen polygons, and point in polygon operations, it was calculated that the average distance travelled would have been 0.94 km if all patients had chosen their closest surgery. One consideration in the decision to seek care from a practice which is not geographically closest to the patient's home address may be the patients perceptions of the time spent travelling to their general practitioner. This possibility was investigated by mapping perceived travel time contours based on questionnaire responses from patients using private transport to attend one practice. This procedure highlighted a pocket of difficulty for a group of patients reporting a travel time of thirty to forty-five minutes despite being close to the surgery in crow-fly terms; the opposite effect was also evident - some patients further away from the surgery reporting short travel times. Comparison was also made between perceived distance (as reported in the questionnaire survey) and actual network distances travelled to each of four participating practices. Although patients perceptions are a subjective measure and might be influenced by many factors, the patterns may provide an indication of patients' general impression of ease of access. Figure 9 illustrates that patients attending surgery 2 appear to believe they live closer to the practice than they do, whereas a significant number of patients from Practice 18 overestimate their distance from the practice.

Discussion

Recent years have seen a burgeoning interest in the geographical and spatial aspects of the analysis of health care delivery. GIS technology has been identified as a potentially valuable adjunct in epidemiology (Lovett, 1992) and in the spatial analysis of health care utilisation. This study examines the potential role of GIS technology within the context of general practice, and at the boundary between primary and secondary care - the Accident and Emergency department. We have used the querying and display functions of ARC/INFO, and the analysis of straight line, network, and perceived travel distances to service centres to highlight issues relating to the accessibility of primary care medical services. We have confirmed distance from the accident and emergency department to be a determinant of a patient's decision to self refer there for medical care, and have highlighted the effect that distance *per se* has in the decision made by patients regarding which practice they will receive care from. Contour mapping of perceived travel time has highlighted difficulties for some

patients in their perception of the accessibility of local medical services. Integration of information obtained from patient surveys and electronic data capture of hospital records with census information has permitted investigation of some of the socio-economic variables potentially influencing the use of these services.

Geo-referenced information was derived from postcode information obtained from several sources. The questionnaire survey yielded an adequate overall response rate. Information regarding hospital AED attendance was obtained from the hospital's computerised record of AED attendance, and was assumed (in view of the far reaching administrative and medico-legal implications) to be a complete record of all AED attendances during the study period. Postcode matching, and consequent georeferencing of information was achieved for 75% of the postcodes provided. It was not possible to say how much of the remainder was a result of inadequate postcode information provided at source by patients, inadequate processing by hospital staff, or limitations of the POSTZON file to match postcodes.

Service Utilisation

Service utilisation has been described previously as "revealed accessibility" (Joseph and Phillips, 1984). In this study we have highlighted a distance decay effect in the self referral patterns of patients to one Accident and Emergency department. Self referral was chosen as the unit of investigation since this is determined by the patients themselves, and so is not subject to medical determinants such as the notoriously variable referral patterns amongst general practitioners (Coulter et al. 1992). Incorporation of network distance information resulted in a change in the shape of distance buffers mapped centering around the Accident and Emergency department although a distance decay effect was still clearly evident.

A five fold variation in self referral to Accident and Emergency was evident amongst the population of the twenty postcode sectors in West Lothian. Mapping of census variables potentially contributing to this variation revealed the possible contribution of socio-economic factors such as those employed in the Jarman UPA score. In this situation GIS proved a useful tool for highlighting potential associations and identifying areas in need of further research and analysis.

The definition of optimal catchment ("trading") areas around practices on the basis of distances between practices, and the mapping of home location of patients attending the practice during the one week survey period revealed the crow-fly distances travelled from home to practice and the dispersion of these patients around the practice. The numbers of patients a general practitioner can adequately provide quality care for has been the subject of recent research (Butler and Calnan, 1987; Calnan and Butler, 1988; Groenewegen et al. 1992; Campbell, 1996), but this study highlights geographical dispersion of patients as a further variable which might contribute to the quality-of-care equation. Further work has recently been undertaken examining the relationship between the dispersion of patients around practices and the quality of care provided by those practices (Jenkins and Campbell, 1996).

The perceived accessibility of general practice was investigated by comparing reported travel times to the practice with estimates of network distances travelled. The GIS/Mapping system highlighted a pocket of difficulty for one practice - even when

the method of travel had been controlled for. Mapping of such information results in a striking visual demonstration of an important observation.

Is GIS technology a useful investigative tool?

From the case study outlined above, it is concluded that GIS allows for a wide range of relevant analyses to be conducted - many of these would have been extremely time consuming and/or impossible to complete using traditional methods of analysis. Moreover, the results obtained may be used to augment those from more traditional studies and thus provide decision makers with greater amounts of relevant information from which to make informed decisions. From the first epidemiological studies to the more recent analyses of patient health needs and behavioural patterns, it is possible to trace an increasing interest in and use of GIS in health related studies. To date however, it appears that little time or money has been invested in this potentially useful technology by health care planners in the United Kingdom. It is to be hoped that organisational structures and practices will begin to change to make room for this new approach.

Summary

In order to ensure equality of access to medical services, and to ensure that resources are used in the most cost effective manner, it is increasingly important to understand the influences affecting the utilisation of health care services. This study has successfully employed GIS technology to examine the utilisation of general practitioner and Accident and Emergency services in one geographical area. Utilising the extensive facilities of ARC/INFO in conjunction with database and census information permitted a detailed analysis of the effect of distance on the use of accident and emergency services, and helped examine some of the variables influencing a population's use of Accident and Emergency services. The technology was successfully employed to examine perceived and predicted accessibility of general practices and the spatial distribution of patients using general practitioner services in a one week study period. Such detailed analysis of the spatial elements contributing to the use of these resources could not have been carried out using conventional analyses. It is concluded that GIS technology is an important addition to conventional methods of analysis for defining the use of health services by the population.

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FIGURE ONE

West Lothian, Scotland with main population centres and road network (UK inset)

FIGURE TWO

Accident and emergency (self referral) as a percentage of the 1991 census population. Two kilometre distance bands centred on St. John's Hospital, Livingston, West Lothian, Scotland.

FIGURE THREE

Accident and emergency patients as a percentage of the 1991 census population within two kilometre network distance bands centred on St. John's Hospital, West Lothian, Scotland.

FIGURE FOUR

Accident and emergency patients as a percentage of the total 1991 census population for 20 postal sectors in West Lothian, Scotland.

FIGURE FIVE

Household car ownership by postal sector. Twenty postal sectors in West Lothian, Scotland. Data based on 1991 census information.

FIGURE SIX

Home ownership by postal sector. Data based on 1991 census information for twenty postal sectors in West Lothian, Scotland.

FIGURE SEVEN

1991 Jarman indices by postal sector in West Lothian, Scotland. Twenty postal sectors with data obtained from 1991 census information.

FIGURE EIGHT

Patient locations (stated home postcodes in questionnaire survey) for four participating general practitioner surgeries in West Lothian, Scotland. () Number of respondents in practice.

FIGURE NINE

Actual versus perceived distance to four randomly selected study practices by network distance bands. Plots centred on practice location.

ACCIDENT AND EMERGENCY UTILISATION AND DEPRIVATION

Carlisle et al's recent paper¹ is an important contribution to the literature regarding accident & emergency workload and socio-economic deprivation. I have previously examined determinants of the use of accident and emergency services at the sole accident and emergency department in West Lothian district, Scotland (population 145,000)². I have re-analysed the data to examine the contributions of socio-economic deprivation and proximity to variations between all 26 local practices in annual accident and emergency attendance rates of patients who referred themselves for care.

Straight line distance between the practice and Accident and Emergency was calculated using Pythagoras' theorem applied to the relevant grid references. Carstairs deprivation score³ was allocated to practices using the appropriate postcode sector for the practice address. Spearman correlation co-efficients (ρ) were calculated between Accident and Emergency attendance rates, the deprivation measure for the practice, and distance between practice and Accident and Emergency. Stepwise linear regression analysis was used to further examine the relationships between these variables.

The average annual practice Accident and Emergency self referral rate for the twenty six practices was 127.4 ± 45.5 patient attendances per 1,000 registered patients per year (median 132.7, range 30.0 – 212.2). There were significant correlations between accident and emergency attendance rates and Carstairs' deprivation score for the practice (Spearman ρ 0.584, $p < 0.01$) and the distance between the practice and the Accident and Emergency department ($\rho = -0.486$, $p < 0.05$). Distance to Accident and Emergency (Beta = -0.5, $R^2 = 23\%$) and Carstairs deprivation score (Beta = 0.51, $R^2 = 21\%$) accounted for 44% of the variation between practices in Accident and Emergency attendance rates.

The recent steady rise in Accident and Emergency attendance rates requires explanation⁴. The previous study² reported only distance as an independent predictor of rates of accident and emergency attendance by patients after general practitioner accessibility had been taken into consideration. Carlisle et al studied out of hours activity; this work relates to all accident and emergency activity by patients from practices in West Lothian. Whilst Carlisle et al suggest that deprivation rather than proximity is the more significant influence on accident and emergency activity, the results presented here suggest that both distance and deprivation are of approximately equal importance in explaining variations between practices in accident and emergency self referral by patients. Studies of accident and emergency workload need to take account of proximity and deprivation as potentially important variables influencing utilisation of services.

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