MULTI-PRACTICE AUDITS OF DIABETES

IN PRIMARY CARE

A study to describe organisation of multi-practice audits and to determine variations in prevalence, delivery and quality of care of people with diabetes using multi-practice audit data

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DR KAMLESH KHUNTI

To Pratima, Nitisha, Sachin, Nehal

and my parents

"In theory there is no difference between theory and practice;

in practice there is"

Chuck Reid

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SUMMARY

The principal aims of this thesis were to:

(a)   Investigate the approaches taken by audit groups in primary care in organising multi-practice audits.

(b)   Examine the characteristics of practices that participate in multi-practice audits.

(c)   Describe the prevalence, treatment and delivery of diabetes care in UK general practice.

(d)   Describe the quality of care of diabetes and determine factors associated with good quality care.

(e)   Determine whether multi-practice audits, as a method of quality assurance, are associated with improvements in diabetes care.

Reducing inequalities and implementing quality assurance programmes is a priority for the National Health Service. Audit is key element of quality assurance programmes. There has been an increase in the number of practices taking part in multi-practice audits in primary care. Primary care audit groups (formally known as medical audit advisory groups) have been instrumental in encouraging practice participation in audit, with diabetes being the most common topic chosen for a multi-practice audit. Information is required on how multi-practice audits are being conducted and whether there are improvements in care as a result. There is also a need to examine the quality of data and whether the data are suitable for use by providers of health care, purchasers, researchers and policy makers. The results of these studies would be useful for those implementing clinical governance. A series of studies were undertaken to address these aims.

This thesis was conducted in three parts: Development work, Stage 1 and Stage 2. The development work involved systematic development of evidence-based review criteria to assess appropriateness of care of people with diabetes. Development work also included a questionnaire survey of primary care audit groups to investigate the organisation of multi-practice audits of diabetes. Stage 1 of the thesis involved the feasability of collation of aggregated multi-practice audit data to describe prevalence of diabetes and patterns of diabetes care. Results of Stage 1 provided information at primary care audit group level. This information was used to identify audit groups that had conducted systematic audits of diabetes care. Three of these audit groups were used for Stage 2 of the thesis providing data relating to 169 individual practices. A questionnaire survey and routine health authority data were used to collect information about all the 327 practices in the three health authorities. These data were used to explore the characteristic of practices providing systematic care to people with diabetes and those undertaking audit. Practice level audit were used to explain variations in prevalence, delivery and quality of care of people with diabetes.

The findings in this thesis indicate that multi-practice audit can encourage the participation of large numbers of practices. Audit groups are co-ordinating multi-practice audits and feeding back information to practices on a comparative basis. However, there are lessons for both primary care audit groups and their successors and primary care groups, in the future organisation of such audits. There were weaknesses in the design and conduct of some audits. More attention should be paid to the selection of audit criteria, methods of identifying and sampling patients, data collection procedures, and methods for implementing changes in performance. The results of these studies emphasise the need to

give attention to basic methodological principles.

Although the process of care of patients with diabetes is complex, general practitioners are playing a greater role in its management. At the same time, the quality of care of people with diabetes is variable. In order to improve care, information is required on factors acting as obstacles to improving care. Qualitative and quantitative methods were used for formation of hypotheses about these factors. To date few examples exist in general practice research of the use of multiple methods using both quantitative and qualitative techniques for hypothesis generation. The complexity of delivery of care to people with diabetes is reflected in the large number of potential factors identified in this thesis. This thesis shows the feasibility of using multiple methods for hypothesis generation. Each evaluation method provided unique data which could not otherwise be easily obtained. Similar methods can also be used to generate hypotheses for other exploratory research.

This thesis shows the feasibility of collating audit data and the potential of this approach for describing patterns of care, and highlighting general and local deficiencies. Diabetes multi-practice audits were used as an exemplar for this thesis, however, the methodology should be feasible for other multi-practice audits. This thesis has reported on the compliance with measures of the process and intermediate outcome of care for diabetes in 169 practices in three different geographical areas. The large numbers of practices from three locations, unlike previous studies, is likely to give a more complete picture of the care of people with diabetes in the UK. Previous studies have also reported very little information about the participating practices. Despite recent evidence that complications of diabetes may be delayed or prevented this thesis has highlighted a number of

deficiencies in the provision of diabetes care, variations in care between practices and between different areas.

Information about levels of performance in large numbers of patients can be used to set standards or norms by which individual practitioners can compare their own activity. Comparison of the health needs of local populations with national data could be used to inform commissioning services. However, audits need to employ uniform evidence-based criteria to facilitate collation and allow comparison.

Many factors influence care and studies which investigate individual factors often fail to show substantial effects, but a number of practice and patient factors were identified from the literature which were included in the analysis in this study. The large variations between practices in compliance with measures of process and intermediate outcome of care are a concern. A recent meta-analysis of randomised controlled trials showed that structured diabetes care involving centralised recall systems can achieve good outcomes. However, in this thesis, having a recall system was only associated with improved annual assessment of feet and fundi but not intermediate outcome of care. The models used in this study explained only a small proportion of the variations in care of patients with diabetes. This study therefore confirms that diabetes care is a complex process, and variations in care are due to other unmeasured factors.

This is the first study that has addressed whether prevalence is related to variations in diabetes care. In multivariant analysis, a higher prevalence of diabetes was negatively associated with only one process measure (proportion having an annual check for glycated

haemoglobin). Recent studies have also shown the existence of an inverse socioeconomic

people with increased mortality gradient in people with diabetes. The studies in this thesis

show that quality of care of people with diabetes in deprived areas tends to be lower than

care of people in more advantaged areas, which may help to explain the observed mortality

gradient. Less than half of all people with diabetes have good glycaemic control which is

particularly disturbing in the light of the recent evidence of glycaemic control. There are

various reasons why further improvement in care of diabetes will be a major task for

primary care. Improved provision of diabetes care in the UK will be an organisational

challenge to the newly formed primary care groups, especially those in deprived areas.

Prevalence and treatment rates of diabetes and other chronic diseases can be assessed and

compared using data from multi-practice audits. Collation of audit data could improve

the precision of quantitative estimates of the health status of populations. A standard

method of data recording and collection could provide a new approach that could

considerably improve our ability to monitor disease. The thesis has identified large

variations in the prevalence of diabetes between practices and significant differences in

prevalence between geographical regions. The findings of this study have important

implications for allocation of health service resources. The prevalence of diabetes is set

to rise in the next millennium, largely as a result of a rise in the prevalence of type 2

diabetes. Currently practices receive a single payment, independent of the number of

people with diabetes, for chronic disease management programme for diabetes. The

thesis shows that payment for chronic disease management is not equitable and if

improved care of patients with diabetes would be best served in general practice, then the

method of payment needs to change.

There are no previous studies that have determined which practices deliver diabetes care entirely in general practice. This thesis shows that there are large variations in where diabetes care is delivered. One of the major problems with provision of comprehensive and systematic diabetes care in general practice is the lack of organisation. Nearly two-thirds of people with diabetes are cared for in general practice and accurate data on the type of practices offering general practice care are essential for health needs assessment, planning and the allocation of resources. Delivery of general practice diabetes care is associated with more organised practices with an increased level of nursing support and practices with a high prevalence of diabetes. Higher levels of deprivation are not a barrier to the provision of increased delivery of care in general practice. Recent studies have shown the importance of tight glycaemic and blood pressure control. Implementing this evidence is best served in primary care, because diabetes is a chronic disorder involving a large number of patients. However, this will a place heavy burden on an already stretched primary care diabetes teams.

This thesis is one of the largest UK studies which clearly show that multi-practice audit with peer comparison feedback is associated with improvement in both process and outcome of care. The new White Paper requires wide spread introduction of clinical governance and clinical effectiveness programmes which will incorporate clinical audit. Although a lot of information is available about the proportion of practices taking part in audit, there is less information about the impact on the quality of care. The challenges described in the St Vincent Joint Task Force Report include reduction in long term complications of diabetes. Feedback to providers of data on their performance can be a powerful stimulus for quality improvement. The findings from this thesis confirm

previous findings that multi-practice audits can encourage a large number of general practitioners to participate and bring about changes in behaviour, resulting in improvements in standards of care.

The results of this thesis suggest that several of the strategies developed by audit groups may be applicable to other chronic diseases managed in primary care. Health care systems should consider audit as a method to improve clinical outcomes for adult patients with diabetes and other chronic diseases. The series of studies in this thesis will be valuable for those implementing clinical governance and the national service framework for diabetes. Collation of good quality audit data would be useful for health care providers, purchasers, researchers and policy makers.

In summary this thesis shows

- Participation in audit is associated with larger more developed practices with a general practitioner interested in the clinical topic and in less socio-economically deprived areas.

- Organisations involved in audit are not recording or coding in a consistent format.

- Audit data can be used to determine known prevalence and delivery of diabetes care.

- There are large deficiencies in diabetes care and wide variations in care in between practices and different parts of the country.

- Multi-practice audit of diabetes are associated with improvements in care.

LIST OF ILLUSTRATIONS

ABBREVIATIONS

ADA	American Diabetes Association
BDA	British Diabetic Association
CSAG	Clinical Standards Advisory Group
DCCT	Diabetes Control and Complications Trial
IDDM	Insulin dependent diabetes mellitus
LDSAG	Local Diabetes Services Advisory Group
MAAG	Medical audit advisory groups
NICE	National Institute for Clinical Excellence
NIDDM	Non insulin dependent diabetes mellitus
NSF	National service framework
PCAG	Primary care audit group
PCG	Primary care group
RCGP	Royal College of General Practitioners
RCT	Randomised controlled trial
UKPDS	United Kingdom Prospective Diabetes Study

CHAPTER ONE:

INTRODUCTION

1.1. Introduction

This thesis reports a series of studies that describe variations in quality of care of people with diabetes and the prevalence and delivery of care of diabetes in general practice. Reasons for the variations are also explored and the methodological aspects relating to quality assurance in primary care in the UK are discussed. Previously reported surveys of quality programmes of audit are reported (Chapter One) and a survey of current organisation of diabetes multi-practice audit is described (Chapter Two). Chapter Two also describes a systematic method used to develop evidence-based review criteria to assess appropriateness of care of people with diabetes. A series of studies of collation of audit data were undertaken to describe the quality of care of people with diabetes and the prevalence and delivery of diabetes care in general practice (Chapter Three, Chapter Five, Chapter Six and Chapter Seven). Practice level data allowed exploration of the reasons for the wide variations in quality of care and the prevalence and delivery of care (Chapter Six). Audit as a method of quality improvement is evaluated in Chapter Seven. Finally, the potential uses of collected audit data are discussed (Chapter Eight).

This first chapter sets out the background to the study, and indicates the need for quality assurance programmes for diabetes in primary care.

1.2. Diabetes mellitus

Diabetes is recognised as a group of heterogeneous disorders with the common elements of hyperglycaemia and glucose intolerance, due to insulin deficiencies, impaired effectiveness of insulin action, or both.

1.2.1 Classification of diabetes

Diabetes is classified on the basis of aetiology, natural history, and clinical presentation. Previous confusion over diagnostic criteria were dispelled by the guidelines issued by the World Health Organisation's (WHO) Expert Committee on Diabetes Mellitus (1980). Diabetes was classified as Type 1 or Type 2:

Insulin-dependent diabetes mellitus (IDDM) or Type 1 diabetes.

Type 1 diabetes results from cellular-meditated autoimmune destruction of pancreatic islet beta-cells resulting in the loss of insulin production.

Non-insulin-dependent diabetes mellitus (NIDDM) or Type 2 diabetes

Type 2 diabetes is characterised by insulin resistance and relative insulin deficiency, either of which may be present at the time diabetes becomes clinically manifest. The specific reasons for the development of these abnormalities are not yet known.

Type 2 diabetes accounts for 80% of all diabetes in developed countries (Leese, 1991). The diagnosis of Type 2 diabetes usually occurs after the age of 40 years although the age of onset is often a decade earlier in developing or newly westernised communities. Type 2 diabetes can be asymptomatic for many years and diagnosis is often made from associated complications or incidentally through an abnormal blood or urine glucose test. Type 2 diabetes is often, but not always associated with obesity, which can cause insulin resistance and lead to elevated blood sugar levels. An 'epidemic' of Type 2 diabetes has emerged across the developing world and its migrants. It has been predicted that the numbers of people with diabetes, overwhelmingly Type 2 patients, will increase from the present 100 million or so world-wide to 200 million over the next 15 years (Cruickshank, 1997). Type 2 diabetes is a multisystem disorder with high risk of serious complications.

Cardiovascular disease (coronary heart disease, stroke, peripheral vascular disease) is the most important cause of morbidity and mortality among people with Type 2 diabetes. Chapter 2.1 details the major complications of diabetes and the evidence of interventions for prevention of the complications.

1.2.2 Cost of diabetes

The economic burden of diabetes includes indirect effects on morbidity, employment, productivity and premature mortality, and the direct costs for the use of health care resources (Williams, 1997). Only limited data are available on cost of diabetes in primary care. Studies in primary care have shown that the proportion of people with diabetes patients attending hospital clinics for the care of their diabetes is low. Data from the early 1980s showed that around 50% of people with diabetes in inner-city practices and 20-30% in suburban and rural practices were attending hospital clinics (Williams, 1986). However, there is less data about the proportion of patients not attending either primary or secondary care, and therefore this example of unmet need will have economic consequences for any attempt to improve diabetes care (Williams, 1997).

The cost of the care of people with diabetes in the UK has been estimated at £1 billion per annum based on 1987-88 prices (Williams, 1990). Most of these costs are for managing the complications of diabetes. Studies of the costs of diabetes as a whole suggest that between 4% and 5% of the total health care expenditure in the UK is spent on the treatment of diabetes and its complications (Leese, 1991). The cost of in-patient care for people with diabetes is also disproportionate to the population prevalence of diabetes. Currie et al (1997) found that patients with diabetes occupied 10.7% of bed days and had a crude mean

length of stay of 10.7 days vs 6.7 days for people without diabetes. They estimated that people with diabetes consume nearly 8% of the NHS hospital revenue expenditure. They also projected that in year 2011 the overall cost of in-patient care will increase by 9.4%, but, the proportion of expenditure for people with diabetes will increase by 15% because of age related effects. The economic burden of diabetes is therefore important to consider in the management of people with diabetes. Even small changes in the delivery or quality of care may therefore have enormous financial consequences. However, there are no comprehensive or rigorous economic evaluations of community based diabetes care. One study from Scotland suggests that diabetes care in general practice costs about half of that in hospital (Porter, 1982). Koperski (1992a) in a London practice estimated that each patient cost the practice £24 and the NHS £58 per year to run a diabetes day at the practice. The costs were for running systematic care for people with diabetes. Doctor, nurse, chiropodist, dietician, clerical officer, building and stationary costs were included in the evaluation. The cost to the practice therefore exceeded both the reimbursement received for providing systematic care and the estimated cost of outpatient reviews at the local hospital.

1.2.3 Prevalence of Diabetes Mellitus

The prevalence of diabetes is 1-2% in the United Kingdom (Howitt & Cheales, 1993; Whitford et al, 1995): 75% have NIDDM rising to 80% in those over the age of 40 years (Leese, 1991). Many studies have reported prevalence rates of diabetes, however, estimates have differed considerably depending on the methods used. General practice surveys of known prevalence rates have ranged in recent studies from 1.2% to 1.8% (Howitt and Cheales, 1993; Whitford et al, 1995). Methods of estimating prevalence rates

have included using GP registers (Gibbins and Saunders, 1989; Dunn and Bough, 1996; Howitt and Cheales, 1993), repeat prescription systems (Neil et al, 1987), district diabetes registers (Whitford et al, 1995), postal questionnaires (Neil et al, 1987), house to house enquiries (Mather and Keen, 1985) and hospital registers (Gattling et al, 1988; Higgs et al, 1992; Burnett et al, 1992). The prevalence rates of known diabetes in recent surveys have been substantially higher (Benett et al, 1994; Fleming, 1994; Whitford et al, 1995). Other studies have ascertained total prevalence (including previously undiagnosed cases) using glucose tolerance tests (Marks, 1996). One study also included a capture-recapture methods using independent data sources and demonstrated a completeness of ascertainment of the survey of 90.1% (Di Cianni et al, 1994). Howitt and Cheales (1993) have argued that it is feasible to compile a register of people with diabetes (and therefore determine prevalence) using only general practice sources.

1.2.4 Diabetes registers

Diabetes registers are central to running an organised district diabetes service ((Burnett et al, 1992). Although they may be difficult to compile, Howitt and Cheales (1993) showed that it is feasible to compile an accurate register of people with diabetes in a district and evaluate their characteristics by using only general practice sources.

Previous attempts to involve GPs in compiling diabetes registers have not always been successful (Burnett et al, 1992). Factors influencing a favourable response in this type of initiative include general practice ownership, feedback of data to the practices and maintenance of confidentiality (Howitt and Cheales, 1993). The St. Vincent Declaration (St Vincent Joint Task Force for Diabetes, 1995) and the Clinical Standards Advisory

Group (1994) recommend that comprehensive diabetes registers are developed and maintained for the assessment of local needs, ensuring comprehensive continuing care and maintaining the quality of care.

1.2.5 Diabetes in primary care

GPs have been increasingly involved in diabetes care over the last 15-20 years. Previously the GP's role was considered to be someone who detected new diabetics and referred them to the diabetes clinic for assessment and registration (Hill, 1976). Since the early 70's it has been argued as a disease suitable for follow up in primary care (Wilkes, 1973; Tasker, 1984; RCGP, 1981).

Primary care has been defined as first-contact care, delivered by generalists, but dependent on teamwork, and which is accessible (both geographically and culturally), comprehensive, co-ordinated, population-based and activated by patient choice (Gordon and Plamping, 1996). Primary care is widely perceived to be the core of an efficient and equitable service in both developed and developing nations (WHO, 1978). The GP as a primary care clinician is therefore not only a gatekeeper role but a provider of a triage system as well as an information giver (Greenhalgh, 1998a). The most fundamental change in the management of diabetes care in the last decade has been the shift in clinical management responsibility from secondary to primary care. Diabetes is a multi-system disease often associated with comorbidity and social needs. Successful management of people with diabetes depends on continuity of care and negotiation of personal targets for lifestyle change (Tasker, 1998). GPs are therefore well placed to provide and co-ordinate such a service in primary care. The advantages of primary care include early contact with patients and therefore opportunities for screening, diagnosis and prevention,

and the generalist approach to multi-system diseases and their social and family consequences (Griffin and Kinmonth 1997a; Griffin, 1998). Previous studies have also shown that patients prefer to receive diabetes care in general practice and are more likely to attend here than a hospital outpatient clinic (Kinmonth et al, 1989; Murphy et al, 1992). The patients' choice of follow up in primary care reflects their confidence in the knowledge and skills of their GP (Kinmonth et al, 1989, Murphy et al, 1992). Figure 1.1 shows key people involved in the care of people with diabetes and illustrates its multidisciplinary nature.

Models of shared care schemes in diabetes

Many different models of shared care are now established, however, the successful schemes share some common key features (Griffin and Kinmonth, 1997a):

(a) *Organisation and structure*: Successful shared care schemes are highly organised and have a comprehensive and accurate register of people with diabetes and run a recall system in dedicated clinics.

(b) *Accessible Specialist Services*: The consultant diabetologist, chiropodist, ophthalmologist, diabetes specialist nurse and dietician are readily accessible for diabetes care to succeed in the community.

(c) *Guidelines for Management*: Guidelines, ideally laid down in protocols drawn up and agreed by the hospital and community teams have a potential for influencing process and outcome of care.

(d) *Audit*: Audit at all levels from the individual doctor to the district help to influence the development of shared care.

(e) *Patient selection*: Most effective shared care schemes have tended to concentrate on uncomplicated Type 2 diabetes. More recently people with Type 1 diabetes have increasingly been included.

The NHS Executive (1997a) issued a Health Service Guideline *Key Features of a Good Diabetes Service* which is a framework against which health authorities could assess the adequacy of the service provided locally. This document explicitly states that in addition to providing evidence-based structured care reflecting local needs, the service should be primary care based. Indeed, GPs have been encouraged to develop services for diabetes since 1993 with a specific payment for doctors offering structured diabetes care (NHS Management Executive, 1993a). As a result, the proportion of people with diabetes reviewed annually in primary care has increased (Goyder et al, 1998). GPs are now playing a greater role in the care of their patients with diabetes (Jones and Marsden, 1992; Goyder et al, 1998), a trend which may continue as practical steps are being taken to develop the framework for a primary care-led NHS. However, there is little evidence to support the existing degree of general practice responsibility for diabetes care (Griffin, 1998). There are large variations in care, and some have argued that the provision of diabetes care in UK will not be redressed by simply making diabetes care a primary-care-led system, but will require a more general organisational challenge (Greenhalgh, 1998a). One review of literature concluded that primary care can be as effective as secondary care when judged by commonly used performance measures such as frequency of laboratory tests, frequency of review, and measurement of glycated haemoglobin (Greenhalgh, 1994).

Figure 1.1 Key people involved in care of people with diabetes

PATIENT

Community Services

PRIMARY CARE
GP
Practice nurse

Dieticians

Chiropodist

Optometrists

Ophthalmologists

Diabetes Specialist Nurses

SECONDARY CARE

Psychologists

Diabetologists
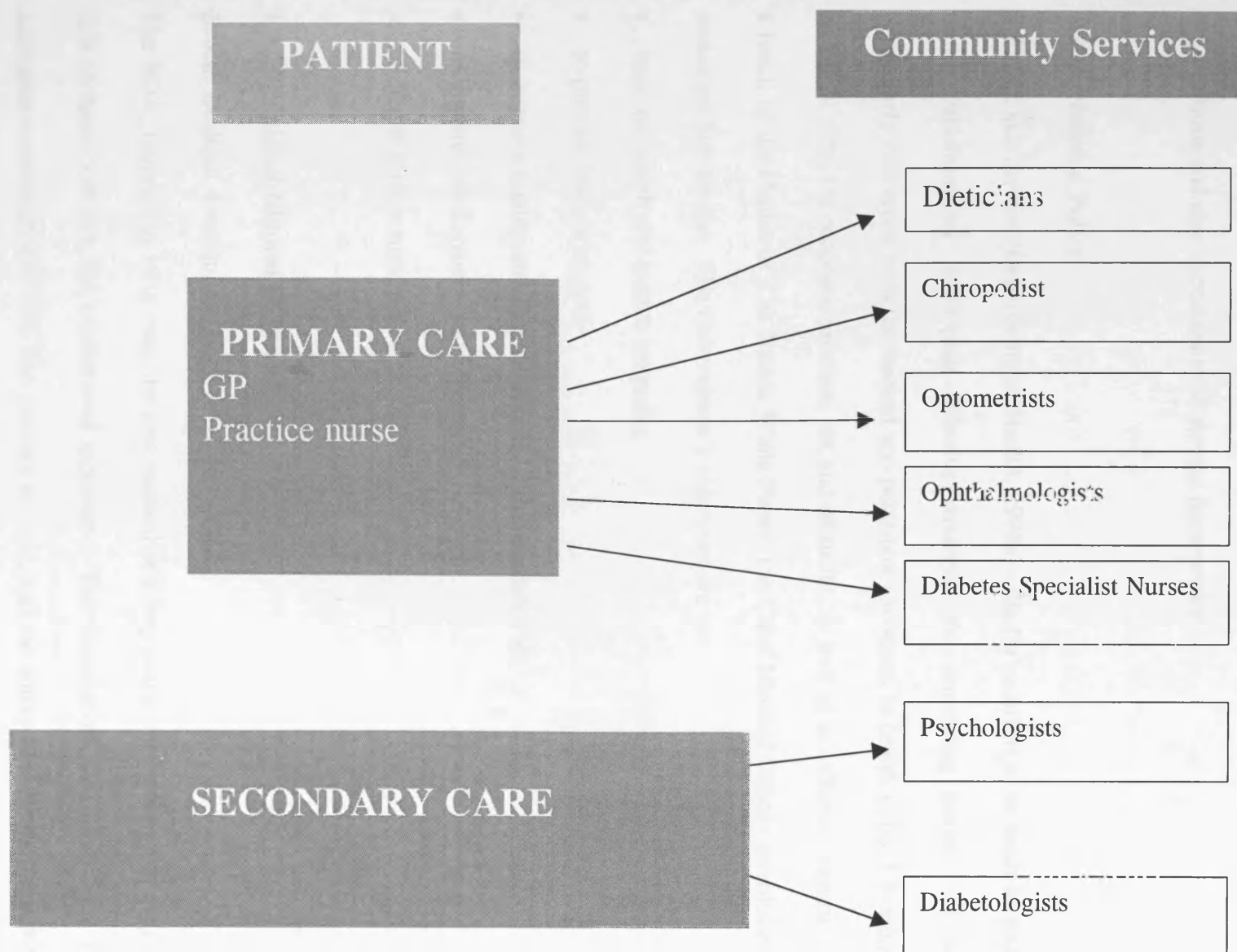
1.3. Major initiatives to improve diabetes care in United Kingdom

There have been various initiatives to improve standards of diabetes care in the UK over the past 10 years. These initiatives have included calls by the government, medical organisations and also introduction of service frameworks.

1.3.1 National Policy

A First Class Service (Department of Health, 1998a) calls for an effort to be made to tackle health variations by developing effective strategies for improving health. It was particularly concerned with the marked and persistent variations in health in the UK among people of different occupational class, sex and ethnicity, as well as in different regions. As a result of the Health of The Nation White Paper, the Chief Medical Officer established a variations Sub-Group. The Government's objectives are to:

- improve health and reduce inequality

- to provide integrated care

- to improve quality and responsiveness, and raise standards

- to improve performance and efficiency

- to enable staff to maximise their contribution

1.3.2 National Clinical Organisations

British Diabetic Association

The BDA, founded in 1934, was the first medical self-help charity in Britain, and also the first to have both lay and professional members. The Association was founded by RD Lawrence, a diabetologist who had diabetes himself, and the author HG Wells. The aims then were the same as they are today: to help and care for people with diabetes and those

close to them, to represent and campaign for their interests, and to fund research into diabetes.

The BDA represents more than 180,000 people with diabetes as well as professional members. It is recognised by government as the voice of diabetes and campaigns on behalf of patients and health care organisations. The BDA is a charity for people with diabetes, their carers and healthcare professionals working in the diabetes field. The Association values its links with scientific researchers and all healthcare professionals. Much of the BDA's work is geared towards bringing about better services and standards of care for people living with diabetes. Underpinning all their work is the St Vincent Declaration.

Royal College of General Practitioners

The Royal College of General Practitioners (RCGP) Clinical Audit Programme has seen substantial changes since its inception in 1991. There is now a trend towards developing and implementing new methods of supporting effective clinical practice. The RCGP has formed expert groups and examined ways of getting research into practice. A new national guideline development programme is also under way. These developments provide an opportunity for the RCGP to demonstrate the effectiveness of British general practice by bringing together the work of evidence-based practice, clinical audit and outcome assessment to create a national programme to assist practice teams to evaluate the quality of their care - The Clinical Practice Evaluation Programme (CPEP). The programme is intended for multi-disciplinary teams including GPs, their practice teams, secondary care and patients. Through the RCGP Effective Clinical Practice Program, the College has identified Type 2 diabetes as a suitable topic for the development of a

national clinical guideline. They have recognised the lack of standards linked to available evidence. Rigorous methodological approaches are being used to produce evidence-based recommendations for multi-disciplinary teams working both in primary and secondary care. The Type 2 diabetes guideline development programme is managed in collaboration with the Royal College of Physicians, the Royal College of Nursing and the British Diabetic Association. A steering group comprising representation of these bodies has established a multi-disciplinary Recommendations Panel including wider membership.

1.3.3 Service Frameworks

St. Vincent Declaration

Representations of government, health departments and patients' organisations from all European countries met diabetes experts at the WHO regional offices for Europe and the International Diabetes Federation in Saint Vincent in Italy in October 1989. They unanimously agreed on the following recommendations for countries throughout Europe: "It is within the power of national governments and health developments to create conditions in which a major reduction in this heavy burden of disease and death can be achieved. Countries should give formal recognition to the diabetes problem and deploy resources for its solution". They identified patient-centred care, education and training, preventing complications and creating diabetes registers for auditing quality of care as priorities. The declaration recommended implementation of effective methods to prevent complications (St Vincent Task Force for Diabetes, 1995):

- Reduce new blindness due to diabetes by one third or more

- Reduce the number of people entering end-stage diabetic renal failure by at least one third.

- Reduce the rate of limb complications of diabetic gangrene by half.

- Cut morbidity and mortality from coronary heart disease in people with diabetes by vigorous programmes of risk factor reduction.

- Achieve pregnancy outcome in women with diabetes to that of women without diabetes.

The St. Vincent Task Force was established in 1992 jointly by the Department of Health and the British Diabetic Association to advise on the implementation of the St Vincent Declaration. Health care practice in Europe has been influenced not only by the St Vincent declaration but also the Joint European World Health Organisation and International Diabetes Federation Initiative, which emphasises prevention of diabetic compilations. The care plan aims for optimum blood glucose level control as well as detection and correction of risk factors for diabetic complications.

Local Diabetes Services Advisory Groups (LDSAGs)

LDSAGs provide a collaborative and multidisciplinary setting for implementing and monitoring changes as a means of improving local care of people with diabetes. The St. Vincent Joint Task Force (1995) made recommendations for early establishment of a LDSAGs. LDSAGs include all commissioners, primary and specialist diabetes care providers, and also people with diabetes and their carers. Their role is to identify inadequacies and to advise on and improve strategies and future developments in the delivery of diabetes care. Representation of GPs and practice nurses are therefore of great

importance. The long term purpose of these groups is to contribute to the formation of a comprehensive local strategy for diabetes, make recommendations and advise on improvements both in clinical and administration terms, which will provide people with diabetes with a high quality service. Many LDSAGs are also advising local improvement strategies in the light of local audit results.

British Diabetic Association : Recommendations for the management of diabetes in Primary Care.

Recommendations for the management of diabetes in Primary Care was initially published in 1993 (BDA, 1993) and then revised in 1997 (BDA, 1997). This document sets out the features of good clinical care as set out by the St Vincent initiative. It is intended to assist all those professionals involved in the care of people with diabetes. The emphasis in the document is primarily on the organisation of practice-based care, rather than on clinical management in diabetes. The document also emphasises the need for quality assurance, clinical audit and evaluation of diabetes care, and to ensure standardisation of data collation to enable aggregation of data.

Clinical Standards Advisory Group

The report of the Clinical Standards Advisory Group (CSAG) (1994) on standards of clinical care of people with diabetes identified deficiencies in the provision of diabetes care and considerable regional variations in the standard of care received by people with diabetes. Major contributory factors included lack of awareness of the importance of diabetes, poor co-ordination of hospital and community-based services, and lack of necessary information technology. All localities recognised the importance of a team

approach to the management of diabetes but some were unable to develop diabetes teams effectively. One of the reasons was the significant shortage of other team members, particularly diabetes specialist nurses, dieticians, chiropodists and consultants. Access to care was evidently enhanced by enthusiastic and well organised primary health care. Local attempts have been successful in identifying some areas of diabetes care in need of improvement. However, in a few localities even the most basic process data were not available. Some form of regular audit was usually taking place, but, there was an absence of awareness amongst some persons of the importance of these initiatives and in the identification of needs and the assessment of the success of processes of care. Some localities expressed concerns regarding the ownership of data available for audit. Many providers regarded these data as their own property and were reluctant to give local purchasers access to them, partly for reasons of confidentiality and partly for reasons of commercial sensitivity.

CSAG recommended that comprehensive diabetes registers should be developed and maintained to assist and assess local needs in insuring comprehensive continuing care and in monitoring quality of care. Furthermore, they recommended that standards for continuing diabetes out-patients care should be expressed separately within contracts in order to ensure appropriate performance and quality monitoring. They also recommended that diabetes teams should be examining, on at least an annual basis, the success of the care delivered through aggregation of results from metabolic outcome measures and true adverse patient outcomes. CSAG concluded that diabetes care should be equally available to all individuals with the condition and the provision of care should reflect its prevalence. Furthermore, services should be geographically accessible and the

different components of diabetes care integrated within a locality. Information about availability of services and walking and telephone access to advice should also be readily available (Clinical Standards Advisory Group, 1994).

Health Services Guidelines - Key features of a good diabetes service

The Health Service Guidelines, *Key Features of a Good Diabetes Service* were published in 1997 (NHS Executive, 1997a). The guidelines are the first practical step forward in the Government's endorsement of the St. Vincent Declaration. They draw attention to the importance of diabetes services and the potential for improvement. They were sent to all Health Authorities and fundholding practices in England, and were intended for all those involved in planning, providing and receiving diabetes care. The document placed emphasis on the development of high quality local diabetes services through partnership between professionals, managers and all concerned with diabetes at a local level.

Key Features of Good Diabetes Service stressed the need for a structured programme of care and programmes of continuing medical education for all health care professionals, patients and carers. It also emphasised a system for collecting data about the process and outcomes of care and a system for auditing the quality of care. Objectives were set for:

(a) A well informed public

(b) A highly trained and skilled workforce

(c) A seamless service, working across health sector boundaries, and sensitive and responsive to differing needs.

(d) Knowledge-based decision making which takes account of international, national and local research.

National Service Framework for Diabetes (NSF)

The Secretary of State launched a rolling programme of NSFs in the White Paper (Department of Health, 1998b). Generally only one NSF will be published per year. Each NSF is being developed with the assistance of an external reference group, that brings together health care professionals, service users, carers, health service managers, partner agencies and other advocates. Diabetes has been chosen as a NSF to be developed in the next two years. NSF have been developed to establish service models to ensure patients receive greater consistency in the availability and quality of services across the NHS. NSF will set national standards and define service models for a specific service, place programmes to support implementation and establish performance measures against which progress within an agreed timescale will be measured. The NSF for diabetes should help to ensure that people with diabetes are given a greater priority in future NHS spending and will get diabetes at the top of the health agenda.

Well accepted measures of the quality of diabetes care include: annual assessment of eyes, feet and urinary albumin, measurement of blood pressure, assessment of glucose and lipid levels, and enquiry and advice about smoking habits (St Vincent Joint Task Force, 1995). Advice about diet and lifestyle is also indicated. It follows that if disease management programmes could reduce the occurrence of complications, substantial savings would be generated. An ability to lower risk factors and prevent complications have been demonstrated for programmes that improve blood glucose control, lower blood pressure and monitor and treat incipient foot problems, retinal disease and nephropathy. The St Vincent Declaration demands that these elements of care should be systematically organised

and competently performed (Keen et al, 1996). These are all aspects of care which can be monitored by audit.

1.4. Quality Assurance

Systems for quality assurance are used to improve quality of care primarily. Secondly they advance service and professional development and provide accountability (Lawrence et al, 1997). Such systems require standards. It is important that the medical and allied professions offer the highest possible quality of service, and be accountable for that service through quality assurance (Lawrence et al, 1997). Systems of quality assurance have been set up in most countries, however, these systems employ different methods varying from inspection by external appraisers at one extreme, to discussion between colleagues at the other (Lawrence et al, 1997).

Over the years, governmental bodies, health service managers and researchers have turned their focus into controlling costs of health care whilst maintaining or improving quality. The combination of concerns about cost and the risk of consumerism led to the widespread adoption of quality assurance.

Donabedian (1980) argues that a definition of quality can usefully begin with defining care which he describes as "the management by a physician, or any primary practitioner, of a clearly definable episode of illness in a given patient".

Donabedian (1980) described providers of care as (a) a single practitioner, (b) several practitioners of the same or different professions or occupations, (c) a formally or

informally organised team, or (d) an institution, plan, programme, or an entire system of medical care. Therefore "traditionally, the object of concern in any definition or assessment of the quality of care has been the care provided by an individual practitioner" with an individual patient, "with a view to improving or preserving physical-psychological or social function". He expands this definition into a broader concept of quality to several practitioners participating in the care of a patient and states that it is then necessary to assess the separate combination of each provider. Therefore the assessment of performance of an individual practitioner in managing a case load, and of the performance of a program in serving a target population are very similar. Quality assessment at the level of the patient and practitioner interaction therefore are similar to those at programme level if the practitioner is held responsible for the management of his entire case load, or for a specified enrolled population. If quality assessment reveals deficiencies in performance at practitioners level then it is necessary to investigate reasons for these deficiencies into other parts of the organisation, involving many elements of performance evaluation.

1.4.1 Structure, process and outcome of care

Donabedian (1966) classified the constituents of care into structure, process and outcome, the definitions of which are given in Box 1.1. Donabedian postulated a broad definition of health and included improvement of social and psychological function, physical and physiological aspects of performance, patient attributes (including satisfaction), health related knowledge acquired by the patient, and health-related behavioural change. Donabedian (1980) also reiterates that measures of outcome (for example avoidable mortality) should be combined with measures of the process (avoidable factors) of care to validate whether the outcome reflects the quality of care.

Box 1.1 Definitions of quality assurance, structure, process, outcome and surrogate or intermediate outcome of care

Quality Assurance: The formal and systematic exercise of identifying problems in medical care delivery, designing activities to overcome the problems, and following up to ensure that no new problems have been introduced and that corrective actions have been effective (Lohr and Brook, 1984).

Structure of care: The relatively stable characteristics of the providers of care, of the tools and resources they have at their disposal, and the physical and organisational settings in which they work (Donabedian, 1980).

Process of care: A set of activities of care that go on within and between practitioners and patients (Donabedian, 1980).

Outcome of care: A change in a patients' current and future health status that can be attributed to antecedent health care (Donabedian, 1980).

Surrogate or intermediate outcome of care: An intermediate outcome or a surrogate outcome is an outcome which fulfils certain criteria; is easier to measure compared with the clinical outcome; a statistical relationship should exist between the clinical outcome and the surrogate outcome; a relation should exist allowing predictions of the degree of clinical effect based on the measured effect on the surrogate outcome (Boissel et al, 1997).

Irving (1990) argued that outcome measures are an essential tool for quality assessment but the trend towards measurement of process in general practice results from lack of available, practical outcome measures. This was also echoed by Marinker (1990) who discussed the

difficulties of developing reliable outcome measures when there are so many influences on

outcome in addition to the health care provided to the patient. Others have argued that no

evaluation of health care effectiveness should leave out process at the expense of outcome,

or vice versa (Brook and Lohr, 1985). Furthermore, outcome measures are too crude to be

of value in the measurement of primary health care effectiveness, particularly in a chronic

disease such as diabetes where relatively small changes in outcome occur over a prolonged

period (Hutchinson and Fowler, 1992).

Donabedian (1990) has defined several attributes of health care:

1. *Efficacy*: the ability of care, at its best, to improve health

2. *Effectiveness*: the degree to which attainable health improvement are realised

3. *Efficiency*: the ability to obtain the greatest health improvement at the lowest cost

4. *Optimality*: the most advantageous balancing of costs and benefits

5. *Acceptability*: conformity to patient preferences regarding accessibility, the patient-

   practitioner relation, the amenities, the effects of care, and the cost of care

6. *Legitimacy*: conformity to social preferences concerning all of the above and

7. *Equity*: fairness in the distribution of care and its effects on health. Consequently,

   health care professionals must take into account patient preferences as well as social

   preferences in assessing and assuring quality.

The concept of quality assurance has gradually been developed over a course of two

decades in Europe – the concept emphasising that assuring and improving quality of care

should be performed in a systematic and continuous manner (Grol et al, 1994). It should

also be effectively managed and integrated into normal daily work and practice

management. A system of quality assurance is vital to primary care in UK where the GP acts as a gatekeeper for the health care system and therefore has a responsibility for efficient performance.

Quality of care is very difficult concept to define. The Institute of Medicine has defined quality as 'the degree to which health services for individuals and populations increase the likelihood of desired health outcomes, and are consistent with current professional knowledge' (Institute of Medicine, 1992). Until recently, the two most common quality assurance activities for improving quality of care in the UK have been implementation of guidelines and audit.

1.4.2 Clinical Governance

Clinical governance is described as a "framework through which NHS organisations are accountable for continuously improving the quality of their services and safeguarding of care by creating an environment in which excellence in clinical care will flourish" (Department of Health, 1998a). Clinical Governance is a new way of referring to the professional obligations of all doctors. They must keep upto date and regularly monitor their performance to ensure that their actions serve the best interests of patients. This is nothing new and has already been stipulated in the GMC's guidance *Good Medical Practice* (General Medical Council, 1995):

"You must work with colleagues to monitor and maintain your awareness of the quality of care you provide. In particular you must take part in regular and systematic medical

and clinical audit, recording data honestly. Where necessary you must respond to the results of audit to improve your practice, for example understanding further training";

"..... respond constructively to assessments and appraisals of your professional competence and performance."

Clinical Governance will be a key component in improving quality of care. Many of the activities described within the concept of clinical governance are already being undertaken in primary care. However, these activities are not co-ordinated and Baker and colleagues (1999) have described a model of clinical governance in primary care which related to activities of defining, accounting for, and improving quality at three levels – the health professional, the primary health care team, and the primary care group. A key component of clinical governance will be the dissemination of national evidence-based guidelines by the National Institute of Clinical Excellence (NICE).

Clinical governance is intended to be a more comprehensive approach to quality than clinical audit was. All practices of the primary care group will be required to participate in clinical governance with the aim of improving quality across a range of aspects of care. The guidance *Modernising Health and Social Services: National Priorities Guidance* (Department of Health, 1998b) indicated that all PCGs would be expected to have:

"a rolling annual programme of action covering its three main functions (improving health and cutting health inequalities, commissioning services, and developing primary

and community services), so that by 2002, all PCGs and primary care trusts are delivering measurable improvements against locally agreed milestones and targets".

Clinical audit will therefore be a key component for quality assurance within the clinical governance framework. PCGs are therefore going to need considerable help and support in developing clinical governance. Most PCGs will not have the skills to provide this support and primary care audit groups (PCAGs) are probably best equipped to provide this. PCAGs have had eight years experience offering a range of support activities including clinical audit, guidelines, education, clinical effectiveness and evidence-based practices – all key components of clinical governance.

1.4.3 Clinical guidelines in diabetes

Clinical Guidelines are defined as 'systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances' (Institute of Medicine, 1992). The aim of a guideline is to encourage the provision of optimal care, by recommending elements of care known to be effective and making clear which elements of care cannot be justified by evidence (for which there is little or no justification). Adherence to guidelines should reduce variation between practitioners.

There is evidence that guidelines which are properly developed and effectively disseminated and implemented can lead to change in clinical practice and improvements in patient outcomes (Grimshaw and Russell, 1994). There is also now a greater awareness on the best methods of developing valid clinical guidelines (Grimshaw et al, 1995a; Eccles et al, 1996). Practice guidelines are considered to be valid if when they are appropriately

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followed they would lead to change (Grimshaw et al, 1995a). Guidelines are more valid if they are developed using systematic reviews by national or regional guideline development groups and have explicit links between the recommendations and scientific evidence (Grimshaw et al, 1995b). In addition, guidelines are more likely to be successful if they are developed by a multi-disciplinary group containing representatives of the key disciplines involved, disseminated through educational interventions and implemented via patient specific reminder during consultation (Grimshaw et al, 1995b).

The provision of care to people with diabetes involves many health care professionals in primary, secondary and tertiary care. Thus diabetes easily satisfies the criteria for guideline development (NHS Executive, 1996a):

- where there is excessive morbidity, disability or mortality

- where treatment offers good potential for reducing morbidity, disability or mortality

- where there is wide variation in clinical practice around the country

- where the services involved are resource intensive, either high volume and low cost or low volume and high cost

- where there are many boundary issues involved, sometimes cutting across primary, secondary and community care, and sometimes across different professional bodies.

Guidelines for the management of diabetes are available. These include guidelines from the British Diabetic Association (BDA, 1997), the St Vincent Task Force (St Vincent Task Force, 1995), and the Royal College of General Practitioners (RCGP, 1993). The Clinical Standards Advisory Group has also published standards of clinical care for and access to an availability for patients with diabetes (Clinical Standards Advisory Group, 1994). The

American Diabetes Association has also published standards of basic care of people with diabetes (American Diabetic Association, 1996). However, these guidelines are not supported by explicit research evidence. Recently the Scottish Intercollegiate Guidelines Network (SIGN) have produced evidence-based guidelines for the management of diabetic foot disease (SIGN, 1997a) and diabetic renal disease (SIGN, 1997b).

1.5. Audit

1.5.1 Development of audit

Clinical audit is concerned with improving the quality of care for patients. The earliest example of a code of practice in medicine dates back thousand of years, the most well known to us is the Hippocratic Oath. One of the earliest examples of audit in this country was recorded by Florence Nightingale during the Crimean war (Crombie et al, 1993). Significant improvements in the survival of the soldiers was achieved by improved sanitation, laundry, and adequate delivery of supplies. Within six months of Nightingale's arrival the death rate among injured soldiers admitted had fallen from 40% to 2%. Although the problems of basic care and hygiene faced by Nightingale at the military hospital may seem irrelevant in the modern NHS, they do illustrate some of the basic features that have become established in clinical audit:

- A health care problem was identified by comparison with another area.

- The deficiencies in the delivery of care were carefully documented. Both study and findings required actions, and the documented evidence was used to help bring about change.

- Implementing change was difficult and a variety of strategies were used.

- Implementing change resulted in improvement in the outcome of care.

1.5.2 Developments in audit in United Kingdom

Audit was recognised "as a proper function for practising clinicians" after the publication of the Cogwheel Report in 1967 (Williamson, 1973). In 1969 the hospital advisory service was established: hospitals were visited by a multi-disciplinary team of doctors, nurses, and administrative staff who were required to inspect all parts of the hospital and talk to as many staff as possible. Problems would be identified and possible solutions were discussed at the end of the visit. Shortly afterwards, the Royal Colleges began to take on an active role in audit. In 1975 the Royal College of Radiologists established a working party on the use of diagnostic radiology, and in 1977 the physicians founded the Medical Services Group essential to carry out audit. Despite this leadership from the colleges, the introduction of audit in Britain was slow, mainly because of professional inertia and also by some factor resistance. One of the main concerns was the loss of clinical freedom. Over the last decade audit has become more established and there are many examples of increasing audit activity among clinical professionals.

One of the early studies in general practice was by Collings (1950) which found very poor quality of care. This survey was to prove important as it gave the impetus for the formation of the Royal College of General Practitioners in 1952. Colling's survey was not a genuine audit since it only documented observations and did not follow-up any change. Examples of full audit cycles were seen in the Confidential Enquiry into Maternal Deaths (Godber, 1976) which systematically focused on the reasons for inadequate care. In 1952 a standard data collection was organised which was reviewed by independent experts at regional and national level to identify cases in which clinical management was unsatisfactory. In the first three years of the enquiry there were 59 deaths associated with placental haemorrhage

of which 89% had avoidable factors. Obstetric flying squads were then introduced to all regions with the policy of early treatment of these cases. As a result of this action the annual number of deaths fell to 24, and the proportion of avoidable factors declined by around a half to 48%. These enquiries led to precise management guidelines which were then implemented. The enquiries were well received by health professionals and led to the establishment of similar systems in Northern Ireland, Scotland, New Zealand and Australia.

1.5.3 Recent developments in audit in general practice

In 1989 that the white paper Working for Patients stated that all doctors should become involved in audit (Department of Health, 1989a). Audit was defined in the white paper as *"the systematic critical analysis of the quality of medical care, including the procedures used for diagnosis and treatment, the use of resources and the resulting outcome and quality of life for the patient"*. Subsequently the NHS in 1990 extended the audit to include nursing and other health care professionals. In 1993, the Department of Health changed the term to clinical audit, making it an activity that was to be multi-professional. The policy of NHS Executive was for audit to become clinical and multi-disciplinary (NHS Management Executive, 1993b). It was predicted that "audit will become largely multi-professional and part of a wider quality management programme that spans all aspects of care in hospitals and the community". The early resistance has gradually declined and there is now growing enthusiasm and audit has become in-built infrastructuring in many of the Royal Colleges.

Since 1990 participation in audit has been a contractual requirement for doctors in hospital and community health services (Department of Health, 1989a; Department of Health, 1989b). In primary care clinical audit has not been compulsory, but from 1991 each family

health services authority set up a medical audit advisory group to support audit in practices (Department of Health, 1990). Box 1.2 shows the stages of the development of audit in England and Wales (Fraser and Baker, 1997). However, not all general practitioners have accepted the concept of medical audit. Surveys of audits actually carried out in primary care have shown a wide range in the quality and quantity of audit performed by general practitioners (Derry et al, 1991; Webb et al, 1991; Chambers et al, 1996; Hearnshaw et al, 1998).

The Department of Health provided ring-fenced funding for the development of audit, but the effectiveness of spending this sum in this way has been questioned (Maynard, 1991; Mooney and Ryan, 1992). Mugford and colleagues in their review concluded that considerable efforts and resources are being used but less effort seems to be spent in establishing whether resources are being used to best effect (Mugford et al, 1991). They stated that the feedback loop of standard setting, information collection, review, and change in practice need to be completed by those in the health service.

In *A First Class Service*, the National Institute for Clinical Excellence (NICE) will provide national guidelines, with clinical governance providing the mechanism for implementation (Department of Health, 1998a). Audit will be a principal component of clinical governance, having a role both in monitoring and implementation.

Box 1.2 Development of Audit Programme in England and Wales (Adapted from Fraser and Baker, 1997).

1989	Plans for audit announced with the principle of professional leadership stated as essential.
1991	A programme introduced to enable widespread adoption of audit by the nursing and Therapy professions (Department of Health, 1991).
1993	A policy statement set out the goal of multiprofessional clinical audit which would involve all health professionals (NHS Executive, 1993).
1995	Audit in England was reviewed by the National Audit Office. (Comptroller and Auditor General, 1995). It was estimated that 20,000 audits had been undertaken in 1993-4, with one third leading to change. Improved monitoring of audit activities was recommended.
1995	The new health authorities given responsibility for funding and monitoring audit, with encouragement to support audit across the primary/secondary interface and to involve patients. (NHS Executive, 1995).
1996	Clinical audit incorporated by the NHS Executive into framework for improving clinical effectiveness (NHS Executive, 1996b).

1.5.4 Audit and feedback

The typical intervention used in audit to implement change is feedback. The feedback may be provided to individual practitioners about their own performance, to teams, or to organisations such as hospital. Feedback usually includes information to enable the recipient to compare his or her performance with others. Nevertheless, it should be remembered that audit can, and is often used with additional implementation strategies such as guidelines, education or facilitation.

A Cochrane Systematic Review (Thomson et al, 1997) investigated the effectiveness of audit and feedback in improving professional practice and health care outcomes. The search was conducted on Medline up to June 1997. The review included random or quasi-random allocation designs with assessment of the quality of trials. Thirty-seven studies were included in the review, but reporting of study methods was inadequate for almost all studies. The results were as follows:

- Audit and feedback alone vs no intervention (13 trials): The relative percentage changes between experimental and control groups were small to moderate (-16% to 152%). In eight of the 13 trials, there was a statistically significant difference in favour of the experimental group. Audit and feedback significantly improved prescribing practices (including a reduction in prescribing and increase in generic prescribing) and reduced diagnostic test ordering.

- Audit and feedback (including educational materials or educational meetings) vs no intervention (15 trials): The relative percentage changes between experimental and control groups were small to moderate (-25% to 62%). In 10 of the 15 trials, there were significant differences in favour of the experimental group.

- Audit and feedback as part of a multi-faceted intervention vs no introduction (11 trials): The relative percentage changes between experimental and control groups were modest (-13% to 56%). In six studies, there were significant improvements in at least one physician performance variable in favour of the experimental group.

- Short term effects of audit and feedback compared to longer term effects after feedback (5 trials): The follow up interval in these trials varied from three weeks to 14 months and the results were inconclusive.

The review concluded that audit and feedback can be effective in improving the performance of health care providers, although, the effects are generally small to moderate. Therefore, audit and feedback should be targeted where it is likely to effect change and should not be used generally for all problems. The review included 37 trials of which 33 were undertaken in North America and only one was undertaken in UK (Howe, 1996). The participants in the UK study were 19 UK GPs treating patients with psychological distress (Howe, 1996). The intervention was audit and feedback with education materials (written and video). The outcome was mean detection of psychological distress rate per physician.

More evidence is therefore needed about the effectiveness of audit with various strategies in the UK. Only one study in the review was concerned with care of people with diabetes (Vinicor et al, 1987). This was a controlled trial of intensive patient and/or physician diabetes education on patient health outcomes. The physicians received intensive education with audit feedback and protocol-based computer-generated reminders. The combination of patient plus physician education resulted in greater improvements in patient outcomes. Because of the multiple intervention strategies used in this study, it is difficult to establish what impact audit and feedback alone had on physician performance. Furthermore, because this study was concluded is USA, it is not generalisable to UK primary care.

1.5.5 Criteria and standards

A criterion (or review criterion) is a *systematically developed statement that can be used to assess the appropriateness of specific health care decisions, services, and outcomes'* (Institute of Medicine, 1992).

A standard is *'the percentage of events that comply with a criterion'* (Baker and Fraser, 1995). Standards are required for assessment of a practice or practitioner's overall performance. Standards therefore describe the level of performance or frequency with which the criterion should be attained in a good clinical setting.

The accepted criteria for selecting a topic for audit (Baker and Presley, 1990) are:

- the subject should be common and important

- an improvement in performance should be of clear benefit clinically

- the standards to be achieved should be clear, realistic, and acceptable

- change in performance should be possible

- the actual performance of the practitioner should be measured with simple

    instruments, and these measures should be repeated after changes have been

    implemented to demonstrate an improved performance.

Audit should employ criteria that have been based on research evidence (Baker and Fraser, 1995). The key attributes of criteria for assessing quality are (Baker and Fraser, 1995):

- Based on research evidence

- Prioritised according to strength of research evidence and influence on outcome

- Measurable – clear and precise

- Appropriate to clinical setting

A previous survey of diabetes care provided by GPs showed that one of the barriers to effective care was lack of time (Chesover et al, 1991). One strategy to address this problem would be for GPs to concentrate on those aspects of care which research confirms are the most important. Furthermore, efforts to improve quality should be concentrated on

those topics for which compliance with research evidence would lead to the greatest improvement in health (Fraser et al, 1997). Specific factors to take into account are:

- the importance of the condition in terms of prevalence and impact on morbidity and/or mortality

- evidence that clinical practice is inadequate and could be improved.

- the availability of convincing research evidence about appropriate practice.

1.6. Primary care audit groups

As part of the reforms of the National Health Service (NHS) in the UK, clinical audit was made obligatory for hospital doctors (Department of Health, 1989a). Although participation for GPs was voluntary, considerable pressure was placed on them to take part. Clinical audit has, therefore, become virtually a universal activity among health professionals and the principal mechanism for quality assurance within the UK.

Audit groups, formerly known as medical audit advisory groups (MAAGs), were introduced in 1991 with the objective of encouraging the participation in audit of all GPs (Department of Health, 1990). MAAGs were funded by local Health Authorities and some groups secured additional funding from research grants, local trusts and pharmaceutical companies. MAAGs appointed a team of around 12 members, including a Chairperson, co-ordinator and facilitators. Membership is multi-disciplinary and includes GPs, representatives of nurses and Departments of Public Health. Audit groups are usually chaired by active clinical professionals (Fraser and Baker, 1997). The activities undertaken include providing training on audit, actively promoting audit among

individual teams and organising audit-projects in which large numbers of practices are encouraged to participate (multi-practice audit).

MAAGs were given the remit of "directing, co-ordinating and monitoring audit activities", but were left to decide for themselves the particular approaches they would use (Department of Health, 1990). Recent studies have shown considerable variation in the way in which audit groups have promoted audit, and in the progress and development of audit activity within general practices. Humphrey and Berrow (1993) found that the strategies adopted by groups depended on the perceptions and attitudes of group members, in particular of the group chairperson. Since these audits require substantial funding and involve considerable effort, information is needed about their organisation (Humphrey and Berrow, 1993; Mugford et al, 1991).

1.6.1 Primary care led multi-practice audits

A multi-practice audit has been defined as "an audit that involves two or more general practices together undertaking the same audit, agreeing the same standard of care to be achieved, collecting the same data, comparing the results individually or collectively, implementing necessary changes, and later collecting data again to measure the effectiveness of those changes" (Baker et al, 1995). In this type of audit, the local audit group designs the audit, the participating practices collect the required data, and the audit group collates and feeds back information to practices on a comparative basis. This can encourage a large number of general practitioners to participate and lead to improvement in care (Fraser et al, 1995).

Some reports of multi-practice audit leading to improved performance have been published. The topics addressed include vitamin B12 prescribing (Fraser et al, 1995), benzodiazepine prescribing (Baker et al, 1997) and diabetes (Whitford et al, 1995). A possible advantage of multi-practice audits is that they can familiarise large numbers of general practitioners with the practicalities of audit, perhaps including many small practices which are sometimes quite isolated (Baker et al, 1995). A further advantage is that the audit review criteria are uniform for all practices within the audit group. As many as 68 multi-practice audits of diabetes care relating to 1,611 practices and 53 audits of asthma care relating to 973 practices had been identified by 1993 (Baker et al, 1995).

A survey by Baker and colleagues (Baker et al, 1995) found an increase in the quantity and quality of clinical audit in general practice as a direct result of the MAAGs. They found that most successful MAAGs have been professionally led and have taken an educational and facilitating role which has led to the commitment of most GPs and their teams. They also found that audit led to improvement in care (Hearnshaw et al, 1998). A report from the National Audit Office (1995) also showed improvements in process and outcome of care. NHS Executive has also recognised that MAAGs have been effective in fostering audit in primary care and it recommended that health authorities should build on the strengths of what already exists in any new arrangements they make for supporting clinical audit (Department of Health, 1996a). Clinical audit has also been suggested as a tool to support health authorities' work on assessing health needs and improving the health of the population (Teasdale , 1996).

Although considerable effort and resources have been used to introduce audit to all general

practitioners, less effort has been devoted to establishing whether these resources are being used to best effect (Mugford et al, 1991).

1.7. Audits of diabetes care

Diabetes care meets the accepted criteria for a topic for audit:

- diabetes is a common chronic condition which leads to high morbidity and premature mortality.

- diabetes affects large numbers of patients in general practices

- many patients are cared for entirely in primary care.

- key objectives of long term systematic monitoring of people with diabetes are the prevention or early detection of complications.

- care of diabetes has substantial cost implications for the patient, the practice and the NHS.

- there is evidence of deficiencies in care.

- better care can improve outcomes for patients.

- there are established clinical guidelines for good care.

There are a number of systems for data collection about care of people with diabetes in UK, but the systems use many different kinds of software. A proposal for continuing audit of diabetes services has been proposed by a Joint Working Group of the British Diabetic Association and the Research Unit of the Royal College of Physicians (Williams et al, 1992). Although, it may be impossible to achieve uniform and ideal control in every patient with diabetes (Pickup, 1988), practices need to take steps to attain higher standards of care.

A literature review was undertaken to identify published reports of multi-practice audit of diabetes. The criteria for inclusion of multi-practice audits were:

- Conducted in the England and Wales.

- Conducted in primary care.

- Inclusion of both Type 1 and Type 2 diabetes.

A Medline search from 1980-1997 was conducted to identify published multi-practice diabetes audits. The search included a combination of MeSH headings and free-text (Box 1.3). An Embase search using the same search strategy was used to identify in particular any relevant articles in *Practical Diabetes*, a key UK diabetes journal which is not indexed in Medline.

Box 1.3 Search strategy used for identifying primary care multi-practice audits of diabetes.

1	quality of health care/
2	quality of care.tw.
3	medical audit / or nursing audit/
4	audit.t.w.
5	process assessment (health care) /
6	process measure$.t.w.
7	outcome assessment (health care)/
8	outcome measure$.t.w.
9	process of care.t.w.
10	outcome of care.t.w.
11	diabetes mellitus/
12	diabete$.t.w.
13	primary health care/
14	primary care.t.w.
15	family practice/
16	general practice.t.w.
17	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10
18	11 or 12
19	13 or 14 or 15 or 16
20	17 and 18 and 19

There have been many primary care multi-practice audits of diabetes care reported in publications over the last 20 years. One of the earliest multi-practice survey identified from the literature was conducted in 1953 (Andrews, 1957). Fifty-five GPs were invited to complete a questionnaire about their patients with diabetes. The main aims of this survey were to determine the prevalence of diabetes in West Cornwall and to determine the workload implications to GPs, district nurses, hospitals, patients and their families.

Many diabetes audits in single practices have shown poor quality of care (Doney, 1976; Kratky, 1977; Fletcher, 1977). Since these audits, several centres in UK had organised general practice care for people with diabetes (Wilkes and Lawton, 1980; Hill, 1976). Singh and colleagues (1984) compared the metabolic control achieved in people with diabetes attending GP mini-clinics to patients attending hospital clinics and found no significant differences. Early single-practice audits involved small numbers of patients. However, two audits from large practices were reported in the early 1990's. Koperski (1992b) reported an audit of 111 people with diabetes in a large practice in central London. He described an initiative of a "diabetic day" for people with diabetes and showed that there were improvements in mean glycated haemoglobin between the first and second data collections (10.5% to 9.7%, P>0.01). There was also a significant increase in all measures of process of care after the introduction of a diabetic day. Kemple and Hayler (1991) carried out a retrospective examination of the notes of 223 people with diabetes in one large practice. Defined standards were not met for many patients. It should be noted, however, that since these were undertaken in individual practices, they cannot be representative of all practices in the UK. Audits that involve a larger number of practices may be more representative, but this is not necessarily the case and will depend on the

procedures for including practices and the proportion that agreed to take part, among other factors.

The literature review did identify a number of multi-practice audits of diabetes care. All of these will now be summarised in two sections: multi-practice audits that did not complete the audit cycle (quality assessment only) and those that did (quality improvement projects).

1.7.1   Multi-practice audits of diabetes care that did not complete the audit cycle

The audits identified are summarised in Table 1.1.

London (published 1980)

The quality of care in general practice was assessed in three group practices (9 GPs) in an east London health district (Yudkin et al, 1980). The hospital and practice notes were searched for details of any diabetic complications which had been observed and recorded in the previous two years. Of the 217 patients studied (prevalence 1%), 46% were receiving their diabetes care in secondary care. The authors found that details of diabetic complications had not always been recorded in the GP and hospital notes. Furthermore, these details were more often available for patients attending hospitals than for those under GP care. Prior to this study, previous published studies had used only hospital patients in determining quality of care of people with diabetes. However, there were clear differences between those patients that attended hospitals and those that were under GP care. This study was one of the first to conclude that "future studies of management of patients with diabetes should include both groups of patients". This study also found that glycaemic control was worse in socioeconomically deprived patients.

Oxford (Published 1983)

Dornan et al (1983) carried out a study to determine the prevalence of diabetes and compare ways of organising care. This was carried out in a market town and a village near Oxford, and involved four practices with a total population 14,000 patients. A medication record review was conducted for 108 people with diabetes. Patients who attended GP mini-clinics or hospital diabetes clinics had better compliance with process measures and better glycaemic control than those patients attending GPs in routine surgery times. The authors, however, did not report when this study was conducted. The results need to be viewed with caution because this was a pilot study involving a small numbers of patients.

Norwich (1984)

A multi-practice audit in Norwich was conducted in 1984, involving seven practices that subsequently established diabetes mini-clinics (Williams et al, 1990). Guidelines were agreed between GPs and hospital consultants for the routine care of uncomplicated diabetes and referral of patients to hospital for evaluation. The scheme also incorporated continuing education and audit. After three years, further data were collected and compared with the baseline assessment. Seven other local practices which had not set up mini-clinics were also studied for comparison. During the project, compliance with the process of care increased significantly and was higher in mini-clinic than comparison practices.

London (1988)

Chesover et al (1991) conducted an audit using patients' records of the management of sample of people with diabetes in 1988 in the South London Faculty of the Royal College of General Practitioners. However, this audit has several limitations because it involved only those doctors (n=77 [24%]) "interested in audit" who were asked to complete proformas from the first five sets of notes of people with diabetes that they encountered. Compliance of process and outcome criteria were assessed if they had been recorded in the patients notes in the previous two years. The criteria were devised from consensus by a research subcommittee of the faculty. Perhaps unsurprisingly, the results showed that compliance with process of care was relatively high for many elements of care.

Mid Wales (published 1989)

A study in mid-Wales identified 469 people with diabetes cared for by GPs in six practices (Gibbins and Saunders, 1989). Data were collected from medical records by one of the GP's prior to the introduction of measures to improve diabetes care. The quality of care was generally poor for all process measures, but compliance was better in patients attending hospital clinics. The authors also found that basic information was often not included in letters from consultant clinics.

Dudley (1989)

A retrospective case note review was undertaken of 452 patients attending 11 general practice diabetes clinics in Dudley between 1989-1990 (Parnell et al, 1993). The GPs were supported by quarterly educational meetings. The criteria for monitoring were adopted from the BDA recommendations. The authors concluded that there was no

evidence that GP diabetes clinics were less successful than the hospital diabetes clinics in controlling and monitoring diabetes. However, the audit was based on measures of process of care reviewed in the previous two to five years. Monitoring was considered 'satisfactory' if the following criteria had been fulfilled: annual BP monitoring for those patients who had proteinuria (or every 5 years if proteinuria was absent) (compliance 93.4%); foot examination every three years (for patients $\geq$ 40 years) (compliance 63.2%); two yearly fundal examination for NIDDM patients with no signs of retinopathy (compliance 68.8%). In addition, there were variations in the level of compliance between the 11 practices taking part.

Newcastle upon Tyne (1990)

A multi-practice audit of four urban group practices in Newcastle upon Tyne with 19 GPs was conducted in 1990 (Tunbridge et al, 1993). The practices were selected for their interest in diabetes care and audit. All practices had been running structured diabetes care schemes, and data were collected prospectively over a 12 month period. Only 186 people with NIDDM were included in the study and only if they were receiving care solely from general practice. Annual compliance with measures of process of care were as follows: BP checked (87%), BMI checked (72%), smoking status checked (87%), assessment for proteinuria (87%), creatinine checked (75%), feet examined (72%), visual activity (72%), fundoscopy (70%), glycated haemoglobin checked (87%) and cholesterol checked (68%). The level of compliance with the process criteria may have been over estimated since the prospective collection may have allowed practitioners to remedy omissions in care during the data collection. Glycated haemoglobin values were within the acceptable range for 62% of patients.

Poole (1992)

A multi-practice audit with 37 (72.5% of those in the district) practices, was conducted in Poole between 1992 and 1993 (Dunn and Bough, 1996). 3974 people with diabetes were included. Each practice was visited and a record review was carried out for all people with diabetes. Process of care was measured for only 2566 patients under GP care and glycated haemoglobin was measured for all 3974 (who completed the questionnaire). A questionnaire survey was also carried out to assess structure of diabetes care. The results were fed back to practices to allow them to compare their performance with the district as a whole. Only a small proportion of practices had previously carried out an audit of diabetes care: 11% had conducted an audit of the process of care and 11% had carried out an audit of the outcome of care. The authors concluded that the standards of care of people with diabetes in Poole were not optimal, although they were as good as those reported by other districts. Glycaemic control was generally poor especially in those patients needing insulin.

TABLE 1.1. Summary of published multi-practice audits of diabetes care in UK primary care (data are for Phase 1 of the audit). Values are percentages unless stated otherwise.

Number of practices	London (1980)[a]	Oxford (1983)[a,b]	Norwich (1984)	London[c] (1988)	Mid-Wales (1989)[a,b]	Dudley (1989-90)	Newcastle (1990)	Poole (1992)
Number of practices	3	4	7	NK[d]	6	11	4	37
Number of patients	217	109	469	293	469	452	186	3974
Prevalence (%)	1.0	0.8	1.1	NK	1.0	NA	0.9	1.6
Weight /BMI	NA	71	57	59;64	26	NA	72	69
Blood glucose	NA	85	71	78;79	52	NA	NA	82
Glycated haemoglobin/fructosamine	NA	NA	16	44;32	31	NA	87[f]	76
Creatinine	NA	NA	NA	40;46	47	NA	75	46
Cholesterol/Lipids	NA	NA	NA	NA	NA	NA	68	25
Urinanalysis for protein/albumin		NA	50	63;64	NA	NA	82	65
Feet assessed	(42/47)[e]	(49/50)[e]	29	(40/48;49/51)[e]	NA	63[g]	72	28
Blood Pressure	64	80	54	81;85	52	(77/93)[h]	87	82
Visual acuity	NA	NA	24	60;59	NA	NA	72	4[j]
Fundi checked	59	61	40	65;64	34	40/69[k]	70	44[m]
Smoking status recorded	NA	NA	NA	NA	NA	NA	87	52

[a] Year study published

[b] Standards calculated from paper

[c] The two figures represent compliance with IDDM; NIDDM patients respectively

[d] 77 GPs

[e] Assessment of peripheral pulses or neuropathy

[f] Glycated haemoglobin values in acceptable range in 62%

[g] Feet examined 3 years if aged >40 years

[h] Annual check if proteinuria/5 years if no proteinuria

[j] Visual acuity only

[k] Fundi checked 2 yearly for NIDDM without retinopathy/Annually for IDDM

[m] Visual acuity and fundi

NK Not known   NA not audited

1.7.2 Multi-Practice audits of diabetes care that completed the audit cycle

The previous section on findings from the baseline data collection of multi-practice audits of diabetes show wide variations in performance and highlight a number of deficiencies in care that should be corrected. The purpose of audit is to improve care, and therefore information is needed about the extent to which multi-practice audits, when completed, do lead to improvements. In this section only audits in which the cycle was completed are included – therefore, at least two data collections must have been undertaken, before and after implementation of change.

Table 1.2 summarises the results of the four published multi-practice audits of diabetes identified by the literature review and undertaken in primary care in England and Wales. The literature review also identified one published diabetes multi-practice audit from Scotland. As the audit met the other inclusion criteria this has been included in this section.

Tynedale (1986-1991)

One of the first completed UK multi-practice audits reported in literature is that from Tynedale, a rural area in England (Carney and Helliwell, 1995). Twelve practices caring for 54,500 patients collected data from practice notes for the first data collection in 1986. Data were compared with a re-audit 1991 following an educational initiative which included a series of postgraduate meetings led by and involving the relevant medical and nursing professionals. Criteria for the management of diabetes were developed by consensus involving local GPs and hospital physicians. The authors found that more patients received GP care or shared care after the educational intervention. There were

also increases in recording of examination for and identification of diabetes complications.

There was also a reduction in the use of oral hypoglycaemic agents among patients with Type 2 diabetes and more patients were maintained on diet alone. A greater proportion of patients were referred to dieticians, ophthalmologists and chiropodists after the educational intervention. The comparisons in this audit were between data collections involving the same practices in the first and second audit.

South Glamorgan (1988 to 1996)

One of the most comprehensively reported multi-practice audit has been carried out in South Glamorgan, a health district with a population of approximately 400,000 served by 74 general practices (220 GPs) (Butler et al, 1997). GPs were offered the opportunity to join a programme of "audit-enhanced care". From 1998 audit assistants visited each practice to collect data on lap top computers from the clinical records of all patients on the practice diabetes register. Each practice was given a confidential annual report that displayed their 'own results' in comparison with the average results of all practices. Meetings were held to present the practice audit data, enabling practices to compare their results with those of their peers in a non-threatening manner that maintained confidentiality. These meetings were attended by GPs, practice nurses and specialists in diabetes medicine and nursing. Continuing medical education and nursing education were incorporated into the meetings.

Between 1988 and 1996, 86% of local practices participated in the programme and during

1995/6, audit data were available relating to over 6000 people with diabetes from 61 practices with a total list size of 386,849 patients. An improvement was reported in the process measures between 1991 to 1995. The audit was carried out by the local audit group, and feedback was provided through meetings and reports which enabled confidential comparisons on past performance and with achievements of their peers. The study authors concluded that sustained continuous improvement in recording of the process of care was made possible in large numbers of general practices in the health district through an integrated process of facilitation and on-going clinical audit, feedback and discussion, self selected targets and continuing education. However, the study did not report on how many practices took part in each year or whether the data related only to practices that had taken part in all the multi-practice audits.

Manchester (1992-1997)

Diabetes care was the first clinical topic to be subject to audit on a large scale by the Manchester primary care audit group in 1991 (Johnson, 1994). The city-wide audit called *Diabetes 2000* was eventually subsumed under the city's LDSAG. The main aim of the audit was to encourage development of a culture of audit in Manchester general practice and improve care of Manchester people with diabetes (Wells, 1998). The audit had four levels: (a) building a register of people with diabetes; (b) monitoring elements of the annual review; (c) monitoring incidence of complications and (d) the recording of incidence of negative outcomes and critical event analysis if appropriate. Anonymised and aggregated data were exchanged between practices. Eighty (72.1% of those in the district) practices had carried out first data collection of the audit by 1993. By 1997, 48 practices had carried out second data collection and 23 practices had conducted a third data collection. The audit

resulted in improvement of all key process criteria (Wells, 1998). The authors concluded that a structure had been put in place to advise the health authority effectively about the quality of services and how they might be improved. This has already resulted in a district eye screening protocol. The LDSAG had been recommended to implement other areas of care including foot screening and coronary heart disease management.

Lanarkshire (1994-1997)

An area-wide audit of the organisation of diabetes care in Lanarkshire began in 1989, following the establishment of the Lanarkshire Diabetic Group (Siann, 1998). This is a multi-disciplinary forum with representatives from primary, secondary and community care. Computer software was developed and installed into hospital clinics and 19 local general practices. By end of 1997, the audit included all Lanarkshire practices and all four hospital diabetes clinics. The results of audit were fed back to each practice with an invitation to attend an area meeting, at which the overall results were presented. There was a progressive increase in the number of people with diabetes registered in the system, and by 1997 the crude prevalence based on 11621 patients was 2.1%. The results showed that overall there was very little improvement (and in some areas a deterioration) in the process of care between 1994 and 1997 in GP patients, but the hospital clinics improved most aspects of the process of care. However, the data collection in 1994 included only 249 patients but in 1997, 3188 patients were included. Therefore these two data collections are not directly comparable, but, the authors fail to discuss this limitation in their paper.

1.7.3 Methodological problems of previous audit studies

There may be an element of selection bias among those audits that were published, and therefore generalisation of findings of these audits to routine multi-practice audits would be unwise. Furthermore, small improvements may have occurred over time without audit, although, the South Glamorgan (Butler et al, 1997) observational study did show substantial changes as a result of audit. However, it is disappointing that only four published reports were identified in which a full audit had been completed despite the publication of many papers reporting baseline data only (Section 1.7.1).

The literature review suggests that multi-practice audits can encourage a large number of GPs to participate and bring about changes in behaviour, resulting in improvements in standards of care (Fraser et al, 1995). However, there are many multi-practice audits that are not completed with a second data collection and there are also other methodological problems that need to be addressed when publishing audit reports.

TABLE 1.2. Summary of published multi-practice audits completing the audit cycle of diabetes care in UK primary care. Values are percentages unless indicated.

	SOUTH GLAMORGAN		TYNEDALE		MANCHESTER		LANCASHIRE[a]	
Year Audits Undertake	1991[b]	1995	1986	1991	1992	1997	1994	1997
Number of Practices	NK	61	12	12	35	23[c]	NK	19
Number of Patients with Diabetes	NK	6109	328	668	NK	NK	4436	11621
Crude Prevalence	1.3	1.6	NA	1.3	1.2	1.5	0.8	2.1
Feedback/implementation strategy	Peer comparison feedback		Series of postgraduate education		Peer comparison feedback		Peer comparison feedback	
Annual compliance with process measures:								
Blood Pressure	85	92	59	73	81	86	95/83	96/74
Weight or BMI	71	82	27	59	68	83	53/78	98/47
Glycated Haemoglobin	72	88	13	87	57	84	84/62	96/63
Smoking	68	91	NA	NA	NA	NA	NA	SNA
Lipids	83	94	15.9	59.7	34	68	55/20	60/29
Urine Albumin	55	72	4.0	4.6	60	73	13/4	26/0.3
Feet (Range)	45/47[d]	89	15/24[d]	(57-64)[e]	31/37[d]	65	85/24[d]	85/28[d]
Retinopathy	45	79	41.8	NA	48	68	88/23	82/26

[a] Hosp/GP patients respectively
[b] Year first audit undertaken, annual audits undertaken since
[c] These practices had completed three audit cycles
[d] Ankle jerk, vibration sense or peripheral arterial disease examined
[e] Patients less than 65 years old
NA   Not known   NA Not audited

1.8. Variations in provision of primary care

Variations in standards are found in all health services and therefore there are many inequalities in the provision of health care in Britain (Majeed et al, 1994a). Deprived areas that might be expected to have a greater need for care often have lower quality general practice services than more affluent areas (Baker, 1992; Gellam, 1992). Uptake of preventative services such as child immunisations (Reading et al, 1993; Baker and Kline, 1991) and cervical cytology (Baker and Kline, 1991; Jarman and Bosanquet, 1992) are often low in these areas. One general practice study showed that there were wide variations in the preventative procedures of GPs (Lawrence et al, 1990). Previous studies have also shown that there are large variations in breast cancer screening rates and cervical cytology rates in general practice (Majeed et al, 1994b; Majeed et al, 1995a). These studies showed negative correlation's with social deprivation, overcrowding, unemployment, and the percentage of patients from non-white ethnic groups. Rates were higher in practices with a computer and larger practices. Reducing inequalities by implementing clinical governance programmes is therefore a priority for the National Health Service (Secretary of State for Health, 1998).

There are also many examples of variations in care of people with chronic diseases such as asthma (Neville et al, 1996) and epilepsy (Jacoby et al, 1996). The previous section reviewed the literature on the variations in quality of care of people with diabetes between practices and between different parts of the country. One study found an association between lack of structured general practice based diabetes care and small practice list size, higher levels of social deprivation and general practice workload (Goyder et al, 1996). However, this study did not evaluate the process or outcome of care. The next section

reviews the literature on studies of single and multiple factors that have been conducted to show reasons for variations in process or outcome of care.

1.8.1 UK studies of single factors associated with variations in diabetes care

Wilkes and Lawton (1980) showed that although care in general practice was popular with patients, the process of care and disease control were poor. The findings were repeated throughout the 1980s in the UK (Yudkin et al, 1980; Hayes and Harris, 1984). As the strategy for diabetes care was redefined (Watkins, 1983), the need for structured primary care of people with diabetes was recognised (Thorn and Watkins, 1982; Gibbins and Saunders, 1988; Foulkes et al, 1989). Studies in the late 1980s showed that general practice care can, at its best, offer improved glycaemic control (Rutten et al, 1990) that was comparable to hospital clinics (Singh et al, 1984). However, despite the research evidence, many GPs and practices continued to offer poor care (Burrows et al, 1987).

Diabetes Shared Care Schemes

Shared care has been defined as "the joint participation of hospital consultants and general practitioners in the planned delivery of care for patients with a chronic condition, informed by an enhanced information exchange over and above routine discharge and referral notices" (Hickman et al, 1994).

The review by Greenhalgh (1994) concluded that structured shared care can be as effective as hospital care in the short term and that several different systems may be equally effective and acceptable. However, an assessment of the review by the Cochrane Review Group (Cochrane Library, 1997) concluded that the evidence was ambiguous and

criticised the review on how the conclusions were reached. There were no criteria for study inclusion or the weight given to different types of studies.

Computerised prompted diabetes care in general practice

A recent meta-analysis of randomised controlled trials comparing general practice and shared care with follow up in hospital out-patient clinics showed that unstructured care in the community is associated with poorer follow up, poor glycaemic control, and greater mortality than in hospital care (Griffin, 1998). The meta-analysis also showed that computerised recall, with prompting for patients and their family doctors, can achieve standards of care as good as or better than hospital outpatient care. Although the meta-analysis was methodologically good, concerns were raised about some of the conclusions (Khunti, 1999; Greenhalgh, 1998b). Only five out of over 1200 studies identified met the inclusion criteria. All patients in these trials were receiving out-patient care at the hospital. Although the proportion of local practices did not explain the inter study heterogeneity in the meta-analysis, the size of the practice was only reported in two trials (Hurwitz et al, 1993; Anonymous, 1994). Only one study reported whether the practices ran diabetes "miniclinics" (Anonymous, 1994). Furthermore, the populations in the studies were subject to selection bias and are not, therefore, representative of the general population. Thus, many potentially confounding variables had not been taken into account in the meta-analysis.

Diabetes mini-clinics

The care of people with diabetes was assessed in seven general practices in Norwich (Williams et al, 1990). These practices participated in establishing a mini-clinic scheme

incorporating continuing education and audit. Data were collected before and three years after the establishment of a mini-clinic. The proportion of patients with NIDDM who were registered with these practices and receiving regular review increased from 54% to 84%. The proportion of patients with a record of body weight, blood pressure, urinary glucose, urinary protein, blood glucose, glycated haemoglobin, visual acuity, examination of fundi and feet and a consultation with a dietician increased significantly and were higher in mini-clinic practices compared to practices without mini-clinics. The authors concluded that organised and audited general practice mini-clinics can improve the process of care of people with diabetes.

Chesover and colleagues (1991) investigated the possibility of an association of the quality of diabetes care (as achieved by an audit carried out by 77 GPs), with the organisation of care (recorded by a questionnaire survey). The questionnaire study was administered to all GP principals in South London Faculty of the Royal College of General Practitioners (response rate 69%). The audit was conducted by only those 77 GPs (representing 24% of doctors who were "interested in audit"). The response to the audit was poor and most likely had selection bias. The analysis found no association of level of diabetes care with type of care received (GP vs hospital shared care). NIDDM patients under the care of GPs with a diabetes register had better supervision than those GPs without a register (p=0.058). Significantly more GPs who had made "organisational changes" to care for their patients with NIDDM had good supervision levels than those that did not (P<0.05). There was no difference in care received in practices with diabetes mini-clinics compared to those without. GPs who had access to a dietician had better control of patients with NIDDM than those without access.

Patient Centred Care

A RCT of additional training of practice nurses and GPs in patient centered care on people with newely diagnosed type 2 diabetes has recently been published (Kinmonth et al, 1998). The study was conducted in 41 practices of which 21 received an intervention of one and a half day's group training on the evidence for and skills of patient centred care and a patient held booklet encouraging questions. The control group received routine care. The intervention group reported better communication with doctors (OR 2.8; confidence interval 1.8 to 4.3) and greater treatment satisfaction (OR 1.6; 1.1 to 2.5) and well being. However, their BMI was significantly greater as were triglyceride concentrations and knowledge scores were lower. There were no significant differences in lifestyle and glycaemic control. However, the authors failed to measure the patient centeredness of the GPs or the nurses counselling behaviour.

1.8.2 UK Studies of multiple factors associated with variations in diabetes care

Diabetes is a complex disorder and many factors may have an influence on care. Previous studies show that psychological factors (Bradley and Marteau, 1986), life events (Robinson and Fuller, 1985), patient knowledge (Hess and Davis, 1983) have an influence on diabetes control. Other factors that have been postulated include the doctor's knowledge (Weinberger et al, 1984), health beliefs (Kinmonth and Marteau, 1989) and personality (Bradley and Marteau, 1986). However, studies that investigate individual factors often fail to show substantial effects and may not put the importance of that factor into true perspective (Bradley and Marteau, 1986). Only two UK studies have determined the influence of multiple factors on quality of diabetes care in UK general practice.

Pringle et al (1993)

Pringle et al (1993) in a descriptive study assessed patient, doctor, practice and process of care variables for their influence on glycaemic control in 318 patients from 12 practices. They used multiple methods which included a notes review, patient questionnaires and examination, doctor questionnaire, videotaping analysis of consultations and practice questionnaire. They found that glycaemic control was associated with treatment groups, sex, years since diagnosis and to the organisation and process of care. Doctors with a special interest in diabetes and bigger and better equipped practices achieved significantly better glycaemic control. Patients attending hospital clinics had worse glycaemic control and the authors attributed this to the case mix, although this was not included in the final multivariate analysis. Practices with access to diabetes services and miniclinics had significantly better control. They concluded that diabetes care should be provided by partners with a special interest in diabetes in well equipped practices with adequate support. However, the factors in this study only explained a small proportion (15%) of the variance in outcome.

Dunn and Pickering (1998)

Dunn and Pickering (1998), in a cross-sectional survey using a questionnaire and a notes review among 37 practices in East Dorset, determined whether the structure (as measured by its organisation) of general practice diabetes care influenced the process or outcome. They found that practices with detailed diabetes register were associated with a higher compliance with some process criteria, but not outcome of care compared to practices without a register. However, there is a danger of selection bias in this study. People with diabetes who attend for routine care in practices with a recall system will

differ from those attending practices without a recall system. The data analysis was carried out at practice level and the sample of practices in this study therefore may have been too small to detect a difference.

1.9. Diabetes care: International perspectives

Evidence from other countries might throw light on the reasons for variations in the quality of diabetes care and how primary care may be best organised to delivery high quality care. Unfortunately, variation in guidelines (and hence criteria for their evaluation) between countries restricts the extent to which performance can be compared between countries (Lawrence et al, 1997). Direct comparisons of care can only be made when guidelines and criteria are similar, and this is most likely if the guidelines or criteria are evidence based. Nevertheless, findings from other countries indicate that failure to achieve high quality of care is common.

1.9.1 United States of America

In the USA over the past decade, recommendations involving effective diabetes care strategies have been formerly adopted and disseminated to primary care providers (American Diabetic Association, 1996). A study by Mayfield and colleagues (1994) reported on the Indian Health Service Model which involved the development of diabetes care standards and an assessment process to evaluate adherence to those standards using medical record review. Medical record reviews were conducted in 6959 people with diabetes. High rates of adherence were noted for blood pressure, weight measurement, blood sugar, annual laboratory screening tests. Lower rates of adherence ($\leq 50\%$) were noted for annual eye and foot examinations. They concluded that the medical record

review system, although labour intensive, could be easily adopted in a variety of primary care settings for quality improvement activities, programme planning, and evaluation.

A large cross-sectional primary care study based on Medicare claims involving nearly 100,000 elderly patients (65 years or over) showed that patients with diabetes were not receiving optimal care (Weiner et al, 1995). The study found that 84% of people with diabetes did not receive a glycated haemoglobin check, 54% did not see an ophthalmologist and 45% did not receive a cholesterol check. The authors concluded that routine administrative databases can be used to support quality improvement activities.

A study by O'Connor and colleagues (1996) showed that the involvement of nurses, physicians and managers in a quality improvement intervention process improved patients' glycaemic control in primary care settings, without increasing utilisation or charges. Another study of 500 rural family physicians care of people with NIDDM based on the standards of American Diabetes Association (ADA) showed that these physicians did not consistently follow the ADA standards of care. The patient records demonstrated 66% compliance with dietary counselling, 66% of patients had fundoscopy and 64% had complete foot examination. 70% of the patients had urine analysis ordered and 45% had an annual lipid measurement. However glycated haemoglobin was performed in only 15% of the patients (Zoorob and Mainous, 1996). Another study investigated out-patient management of people with diabetes (n=669) in Medicare and enrolled in Arizona Medicare plans (Marshall et al, 1996). The study found that 54% had retinal examination, 68% had foot examination, 12% were seen by a dietician, 97%

had weight documented, 60% had an estimation of glycated haemoglobin, 52% had a

lipid profile and only 10% had a dip stick for urine protein. The study concluded that

regardless of payment scheme, diabetes care is characterised by inconsistencies,

omissions and a lower than desirable level of quality of care (Marshall et al, 1996).

Streja and Rabkin (1999) carried out a retrospective chart audit of 519 patients cared for

by 22 primary care physicians in California between 1993 and 1994. Over a period of

two years, 78% of patients had an assessment of lipid profile, 80% had a test for

proteinuria, and 62% were referred to an opthalmologist. Another recent retrospective

audit in four primary care clinics in Mississipi showed that 53% of patients did not have

a record of glycated haemoglobin, 54% did not have a recorded foot examination and

76% did not have a referral for dilated fundscopy. Seventy-two percent had an

assessment of lipids and 68% had an examination for proteinuria (Cook et al, 1999).

1.9.2 Australia

One study of a random sample of 204 metropolitan doctors from 124 practices showed

that only 9% had a diabetes register and 6% had a diabetes recall system (Kamien et al,

1994). The most common process measures complied with in the previous 12 months

were blood pressure (94%), blood glucose (70%), diet (66%), body weight (56%) and

inspection of feet (18%). 52% had glycated haemoglobin measured and 49% had urine

analysis performed. A small study from a three-partner practice in Australia confirmed

poor control in patients with diabetes. Glycated haemoglobin was recorded in 55% (in the

last six months) and annual compliance for process measures were: BP (93%), feet (32%),

weight (63%), retinal examination (37%). This study also concluded that patients who

attended frequently were no more likely to have had a glycated haemoglobin performed than less frequent attendees (Ward et al, 1997).

1.9.3 New Zealand

A large multi-practice audit involving 217 general practitioners representing 75% of the GPs in Aukland with 4611 people with diabetes showed that there were variation in recording of evidence based process measures (Simmons et al, 1997). The proportion of completed patient assessments ranged between 35% (foot pulses) and 89% (blood pressure).

1.9.4 Canada.

Worrell and colleagues (1997) reported on the care of patients in 10 family practices and clinics conducted by a retrospective medical chart review. They found only 53% of patients had glycated haemoglobin measured in the previous year and 87% of these patients had optimal or good plasma glucose levels. Compliance with the Canadian Diabetes Association guidelines was poor and practitioners were only conducting half the recommended checks and procedures.

1.9.5 South Africa

A study of people with diabetes attending five Community Health Centres in black areas of Cape Town identified major problems in the care of people with diabetes in primary care (Levitt et al, 1997). These included poor attendance of patients, infrequent fundoscopy (6.0%) check for glycated haemoglobin (3.4%) and foot examinations (4.7%). However other process measures were examined more frequently: BP (97.4%,

weight (97.4%), urinalysis (99.2%). Although other studies were not identified by the search strategy, the authors of the study concluded that these findings would be replicated in most primary care settings in South Africa. Another retrospective audit of 300 patients attending three large diabetes clinics in community health centres in Black African residential care was reported by Levitt et al (1997). Acceptable glycaemic control was present in 49%. They also found that diabetic complications were not recorded in majority of patients notes.

1.9.6 Europe

The Italian Study Group of behalf of the St Vincent Declaration carried out a study to describe patterns of care of an Italian population (Nicolucci et al, 1997). They investigated care received by 2196 patients under Diabetes Outpatient Clinics (DOCs) and 511 cared for by 49 GPs. Glycated haemoglobin was not performed in 50% of patients under GP care, overall 62% of people with diabetes under GP care had an eye examination in previous 12 months. The authors concluded that these results reflected the ambiguity of the role of GPs in diabetes care.

The quality of diabetes care was evaluated in 95% of all known people with diabetes (n=395) in rural area of Austria using a mobile ambulance (Muhlhauser et al, 1992). This was a prospective study which examined mainly outcomes of diabetes care. Prevalence of hypertension was 54% of which 68% had blood pressure that was uncontrolled ($\leq$160/95). Five percent had foot complications and 1.5% were blind.

One study from Sweden reported a medical record audit of people with diabetes in 1992 (n=177) and 1995 (n=413) in three community health centres in Stockholm (Wandell et al, 1998). The patients were selected randomly in 1992, but all patients were included in the audit in 1995. Retinopathy examination was carried out in 64% in 1992 (65% in 1995), examination for neuropathy in 44% (49%), urine examination in 88% (73%) glycated haemoglobin examined in 52% (68%) and cholesterol in 34% (42%). Acceptable values for glycated haemoglobin were noted in 51% in 1992 (46%). Smoking status was recorded in 26% (53%) and BMI in 5% (39%). However, each health centre had less than 150 people with diabetes.

1.10. Summary

The challenges described in the Saint Vincent Joint Task Force Report include achievement of a reduction in long term, disabling complications of diabetes. There is good evidence that many of these complications may be delayed or prevented. Thus diabetes meets the accepted criteria for an audit topic and multi-practice audits of diabetes are popular in primary care. Moreover, the delivery of diabetes care is likely to develop in the next few years as practical steps are taken to develop national service framework for primary care.

Evidence-based criteria would help ensure uniformity of data definitions, and facilitate the collation of data for comparison over time and among facilities. This will identify areas of weakness in health care delivery and encourage improvements in accordance with the St Vincent objectives. The final report of the St Vincent Joint Task Force (1995) for diabetes care in the UK emphases the need for up to date and continuing education and support for people with diabetes in a local, comprehensive, and organised setting. The Task Force also raised the question of developing "population-based diabetes registers" to assist in covering the clinical needs of all patients and to help collect key clinical information (St Vincent Joint Task Force for Diabetes, 1995).

To date, little is known about the approaches adopted by audit groups in conducting multi-practice audits. There are large variations in management of diabetes between practices. Population based research using individual practice level data are required to improve current understanding of patient and practice characteristics that influence the wide variations in clinical practice.

The literature review has identified many primary care audits of diabetes care. However, majority of these, whether from the UK or other countries, have involved a small number of patients from a few practices. They have also been based in single geographical regions. The majority of published audits have not completed the full audit cycle and there are only two studies that have looked at multiple factors associated with quality of diabetes care.

Purchasers of health care are already responsible for assessing health needs and evaluating services, and the process of monitoring equity is a logical extension of these activities. Information about the health needs of local populations could be used as a guide for commissioning services to meet these needs and guide national service framework for diabetes. Routine audit data in primary care could potentially be used to assess needs for care and monitor how well these needs are being met. The data would also provide information about the quality of care and allow comparisons of performance between practices and between different geographical regions. However, the practicality of collection and collation of audit data has not yet been determined. There are also no previous studies that have shown whether participation in audit results in improvements in care of people with diabetes within individual practices. Such information would be useful for those responsible for implementing qualitative improvement programmes such as clinical governance in primary care.

1.11. Thesis

The principal aims of this thesis were to:

(a)   Investigate the approaches taken by audit groups in primary care in organising multi-practice audits.

(b)   Examine the characteristics of practices that participate in multi-practice audits.

(c)   Describe the prevalence, treatment and delivery of diabetes care in UK general practice.

(d)   Describe the quality of care of diabetes and determine factors associated with good quality care.

(e)   Determine whether multi-practice audits, as a method of quality assurance, result in improvements in diabetes care.

To meet these aims, the thesis was conducted in three parts:

Development Work

1.1 To develop evidence-based review criteria to assess appropriateness of care of people with diabetes.

1.2 To investigate the approaches taken by primary care audit groups to the organisation of multi-practice audits of diabetes.

Stage I:

1. To determine the feasibility of collating primary care audit group multi-practice audit data to describe the pattern of care of diabetes in primary care.

2. To determine the feasibility of using primary care group multi-practice audit data to estimate the prevalence and treatment of known diabetes.

Stage II

The results of stage I would provide information at primary care audit group level. This information would be used to identify audit groups that had conducted systematic audits of diabetes. These audit groups would be used in this part of the study. The aims of Stage II were:

1. To use multiple methods to generate hypothesis about all potential factors that may be associated with delivery of care to people with diabetes.

2. To explore whether practices undertaking diabetes audit differ from those that do not.

3. To describe the pattern of care of diabetes provided by individual practices in accordance with the research evidence and to describe the importance of patient and practice variables in explaining the variations in routine care of people with diabetes.

4. To determine whether practice participation in multi-practice audit of diabetes is associated with improvement in care of people with diabetes.

5. To collate practice level audit data to describe variations in prevalence and delivery of care of people with diabetes.

6. Discuss potential uses of multi-practice audit data in primary care.

CHAPTER TWO

DEVELOPMENT WORK

2.1. Systematic development of evidence-based review criteria for management of people with diabetes in primary care.

Introduction

Preliminary work was required to meet the aims of this thesis as set out in Chapter One. Firstly, evidence-based review criteria were needed to be developed to assess appropriateness of care for people with diabetes. Secondly the quality of multi-practice audits of diabetes conducted in England and Wales needed to be determined. This would allow identification of multi-practice audits for use in subsequent studies.

In the previous chapter, the reasons for choosing diabetes as an audit topic and the aims of the study were described. Although many audit groups now conduct multi-practice audits of diabetes, there are still concerns about how the criteria for multi-practice audits have been chosen or developed. In this chapter the methodology used for developing the audit review criteria is explained and audit criteria selected for this thesis are justified on the basis of research evidence or impact on outcome. In recent years methods for developing valid clinical guidelines have been described (Eccles et al, 1996; Grimshaw et al, 1995a), but less attention has been given to the best methods of developing evidence-based review criteria. Consensus guidelines are available for the management of diabetes in primary care and include recommendations about all potential elements of care. In contrast, criteria are used to judge the appropriateness of care. It is therefore necessary to base the judgement of care that are valid (Baker and Fraser, 1995; Fraser et al 1997). It follows that evidence-based review criteria should relate to the most important elements of care as indicated by research evidence of impact on outcome (Fraser et al,

1997). Furthermore, audit should be based on the best available evidence if it is to have full impact on deficiencies of care (Fraser et al, 1997). We have recently described a method for systematically developing evidence based review criteria (Fraser et al, 1997). The stages of the method are described in Box 2.1. The key elements of care relating to diabetes were identified from available guidelines (British Diabetic Association, 1997; St Vincent Task Force 1995; Royal College of General Practitioners 1993; SIGN, 1997a; SIGN 1997b; American Diabetic Association, 1996) and another key publication on the standards of clinical care for patients with diabetes (Clinical Standards Advisory Group, 1994).

The detailed specification of each criterion was undertaken following a systematic literature search focused on the key elements of care. Outcomes in diabetes can only be determined after many years (Annonymous, 1993). Therefore structure, process and intermediate outcomes of care are used for assessing appropriateness of care in people with diabetes (Butler et al, 1995; Carney and Helliwell 1995; Chesover et al 1991; Dunn and Bough, 1996). The searches for the previous development of an evidence-based protocol for diabetes (Baker et al, 1992) were supplemented with a new updated systematic search. All searches were carried out using the Cochrane Library (1997) and MEDLINE for the years 1986-1997. The searches were confined to studies in English involving human adults. Searches were conducted systematically on medical subject headings and free text using the terms: meta-analysis, reviews and randomised controlled trials. Recommended search strategies (NHS Centre for Reviews and Dissemination, 1996) for identifying systematic reviews and randomised controlled trials were used for the development of each criterion (Box 2.2 and Box 2.3). Search strategies for

identifying trials of diabetes care and trials in primary care are shown in Box 2.4 and Box 2.5 respectively.

Box 2.1 Six stage method for developing review criteria (from Fraser et al, 1997)

- selection of a topic

- identification of the key elements of care

- focused systematic literature reviews to develop, when justified by evidence, one or more criteria for each element of care

- prioritisation of the criteria on the strength of research evidence and impact on outcome

- presentation of the criteria in a final document or protocol

- submission of the protocol to external peer review

The references were sifted for relevance to diabetes in primary care by myself on the basis of article titles only. The retrieved papers were appraised for methodological rigour with greatest weight being given to meta-analysis or randomised controlled trials (Sackett, 1986). Cross referencing from articles found identified further studies for consideration. The evidence for the criteria was synthesised by qualitative methods and then used to develop review criteria. Once criteria were developed, they were prioritised into "must do" and "should do" on strength of evidence and impact on outcome (Baker and Fraser, 1995; Fraser et al, 1997). This was undertaken on the basis of the evidence by a small group which included three GPs familiar with methods of developing evidence-based review criteria. Criteria were not developed for those elements of care for which evidence about importance was lacking. The criteria were then submitted to peer review. The reviewers included four GPs with an academic interest or expertise in

diabetes, two consultant diabetologists and two practice nurses. The reviewers were

chosen to reflect the multidisciplinary nature of diabetes. Reviewers were instructed to

identify any major omissions in the criteria, but none were identified. This chapter only

includes the "must do" criteria (Baker and Fraser, 1995).

Box 2.2 Comprehensive Medline search strategy to identify systematic reviews

```
 1  (meta-analysis or review literature).sh.
 2  meta-anal$.tw.
 3  metaanal$.tw.
 4  (Systematic$ adj4 (review$ or overview$)).tw.
 5  meta-analysis.pt.
 6  review.pt.
 7  case report.sh.
 8  letter.pt.
 9  historical article.pt.
10  review of reported cases.pt.
11  review,multicase.pt.
12  review.ti.
13  review literature.pt.
14  1 or 2 or 3 or 4 or 5 or 6 or 12 or 13
15  7 or 8 or 9 or 10 or 11
16  14 not 15
17  animal.sh.
18  human.sh.
19  17 not (17 and 18)
20  16 not 19
21  subject search terms
22  20 and 21
```

Box 2.3 Search strategy used for identifying controlled trials of diabetes

```
 1   randomised controlled trial.pt.
 2   randomised controlled.tw.
 3   randomised controlled trials/
 4   random allocation/
 5   double-blind method/
 6   single-blind method/
 7   controlled clinical trial.pt
 8   1 or 2 or 3 or 4 or 5 or 6 or 7
 9   animal.sh.
10   human.sh.
11   9 and 10
12   9 not 11
13   8 not 12
14   subject search terms
15   13 and 15
```

Box 2.4 Search strategy for identifying trials of diabetes mellitus

```
1   exp diabetes mellitus
2   diabet$.tw.
3   diabetes insipidus/
4   2 not 3
5   1 or 4
6   (niddm or iddm).tw.
7   diabet$.jn.
8   5 or 6 or 7
```

Box 2.5 Search strategy for identifying primary care studies

```
1   delivery of health care/
2   primary health care/
3   family practice/
4   physicians, family/
5   general practice.tw.
6   1 or 2 or 3 or 4 or 5
```

- **Patients who have been diagnosed as having diabetes must be recorded in the practice diabetes register.**

A manual or computerised register of affected patients is the corner-stone for systematic care as it enables a practice to identify and systematically plan care for their patients with diabetes. Prompting structured care of patients with NIDDM has been shown to be effective in improving outcome for people with diabetes (Griffin and Kinmonth, 1997b).

The register should indicate whether or not patients are receiving insulin and whether they are cared for by the practice alone, or by hospital or shared care as this is required for the chronic disease management programme (NHS Management Executive, 1993a). The number of people with diabetes cared for by an individual GP will vary depending upon the characteristics of the patient list. For example, diabetes is more common in the elderly (Croxon et al, 1991), and prevalence is higher among people of Asian or Afro-Caribbean origin (Simmons, 1992; Hawthorne et al, 1993). Accordingly, to check whether a practice has detected a reasonable number of people with diabetes, they must take into account the age distribution and ethnic composition of the practice population.

- **The glycated haemoglobin (or fructosamine if this is the only test available) has been checked at least annually and the result is within the normal range.**

The glycated haemoglobin value correlates with blood glucose profiles taken between 4-12 weeks previously (Paisey et al, 1980). The Diabetes Control and Complications Trial (Anonymous, 1993) showed that tight control is associated with an approximate 60% reduction in the risk of retinopathy, nephropathy and neuropathy in people with IDDM. However, this dramatic improvement did incur some costs as tight control increased the

risk of severe hypoglycaemia and weight gain. Another trial in Japanese people with NIDDM showed similar beneficial effects arising from the near normalisation of glycated haemoglobin (Ohkubo et al, 1995).

Since the literature review for this chapter, the long-awaited results of the United Kingdom Prospective Diabetes Study UKPDS were published in 1998. This landmark study provided the first clear evidence that tight control of blood glucose (UKPDS 33, 1998) significantly lowers the risk of microvascular and macrovascular complications in Type 2 diabetes. This is the largest study of diabetes ever carried out. The results of the UKPDS 33 are summarised below.

Intensive Glucose Control Study (HBA1c 7% vs 7.9%). Over a median follow up of 10 years from diagnosis of Type 2 diabetes, there was a risk reduction of:

12% for any diabetes related and point	$p < 0.03$	
25% for microvascular end points	$p < 0.01$	
16% for myocardial infarction	$p = 0.052$	
24% for cataract extraction	$p < 0.05$	
21% for retinopathy at 12 years	$p < 0.02$	
33% for alluminuria at 12 years	$p < 0.0001$	

The glycated haemoglobin is the most useful test for assessing the long terms control of blood sugar but reference ranges from results of glycated haemoglobin are not interchangeable between laboratories because different methods of estimation are used (Pickup et al, 1993).

The variability in results of glycated haemoglobin between laboratories and specialist centres has inhibited the interpretation of published research, and precludes direct comparison of data presented in different studies. The BDA offers targets for glycated haemoglobin (Table 2.1) with the proviso that they may have to be adjusted accordingly to the variation in reference ranges in different assays (BDA, 1997). Since the UKPDS study, the optimal targets have been set at below 7% for HBA1c (UKPDS 33). No substantial studies of optimal frequency of glycated haemoglobin test have been carried out. Glycated haemoglobin testing every three to four months provides a useful overall measure of chronic glucose control (Service et al, 1987).

TABLE 2.1 Targets for glycated haemoglobin (BDA, 1997). Figures are percentages.

	Good	Acceptable	Poor	Very poor
Haemoglobin A1	<7.5	7.5-8.7	8.8-10	>10
(Normal 5.0-7.5)				
Haemoglobin A1c	<6.0	6.0-7.0	7.1-8.1	>8.0
(Normal 4.0-6.0)				

There has been some criticism of their targets in that existing targets for metabolic control of people with diabetes are impractical (Butler et al, 1995). In this study of over 3000 patients from 37 general practice, the mean level of glycated haemoglobin in people with diabetes was poor or very poor according to published standards as those set by the BDA. Butler and colleagues argued that targets that are attainable in practice would be more realistic if based on normative data about care delivered in comparable settings. However,

audits in general practice show variations in the proportion of patients whose diabetes is controlled, as measured by glycated haemoglobin (see section 1.7.1 and 1.7.2).

- **The records show that at least annually the fundi have been examined for retinopathy through dilated pupils**

The prevalence of retinopathy reaches more than 90% after 20 years in people with IDDM (Palmberg et al, 1981) but early treatment can prevent blindness in up to 95% of cases of proliferative retinopathy and 70% of maculopathy (Ferris, 1993; Anonymous, 1987). The St Vincent Declaration has therefore set a target of reducing diabetic related blindness by one third (St Vincent Joint Task Force, 1995).

It has been estimated that up to 20% of people with NIDDM already have retinopathy at diagnosis, with 5% of cases needing active treatment (UK Prospective Diabetes Study Group, 1990). Patients with IDDM are at greater risk of retinopathy and visual loss than those with NIDDM (Kohner et al, 1996). Duration of disease is the most important factor for the development of retinopathy. Furthermore, the DCCT has shown that in patients with IDDM, careful control can reduce the development of retinopathy in patients with no pre-existing retinopathy, and also slow progression in patients with early retinopathy (Anonymous, 1993). A meta-analysis also showed that long term intensive blood glucose control significantly reduced the risk of diabetic retinopathy (RR 0.49;95% CI 0.28-0.85) (Wang et al, 1993). Methods for examination to detect pre-symptomatic disease include direct opthalmoscopy by ophthalmologists, optometrists or general practitioners, and retinal photography.

A recent review concluded that retinal photography appears more sensitive than direct ophthalmology, but there is no clearly superior test. Both methods may achieve high sensitivity or specificity under optimal conditions. Combined retinal photography and direct ophthalmology is more sensitive than either test alone (Bachmann and Nelson, 1996). The authors concluded that there are strong grounds for supposing an organised programme of early detection and treatment.

The visual impairment sub-group of the St Vincent joint task force for diabetes has reviewed evidence about screening for retinopathy and have concluded that screening achieves health gains and that screening should take place at annual intervals (Report of the Kohner et al, 1996). The report indicates that a structured programme would be carried out by GP's or optometrists as primary screeners. There are no studies of optimal frequency of examination of fundi.

- **People with diabetes must have annual examinations of their feet and education about foot care.**

People with diabetes are at a 15 times greater risk of lower extremity amputations compared to non-diabetic individuals (Most and Sinnock, 1983). The St Vincent Declaration has therefore set targets to reduce major amputations in diabetes by 50% within five years (St Vincent Joint Task Force, 1995). A recent prospective study of patients attending a secondary care diabetes clinic found that 29.5% of patients were deemed to be at risk of diabetic foot complications (Klenerman et al, 1996). 21.8% had loss of protective sensation under the foot, 7.7% had absent pedal pulses, and 4% had combined vascular and sensory loss. Significant correlation's with developing a foot

complication were: duration of diabetes, age and smoking. People with type 2 diabetes were more likely to be at risk of diabetic foot complications than those with Type 1 diabetes.

One randomised controlled trial in primary care showed that a structured teaching and treatment programme for NIDDM patients resulted in a significant reduction in the number of patients with callus formation and poor nails (Pieber et al, 1995). The teaching and treatment programme consisted of four weekly teaching sessions (90-120 min each) for groups of four to eight people conducted by nurses and GPs.

A RCT in an academic general medical practice of a multifaceted intervention involving patients with NIDDM resulted in a reduction in serious foot lesions and other dermatological abnormalities (Litzelmann et al, 1993). These patients were also more likely to report appropriate foot care behaviours and to have foot examinations during office visits and to receive foot-care education from health care providers. The intervention consisted of nurse-clinicians conducting patient education sessions with one to four patients using slide and audiotape presentations and pamphlets. Follow up reminders consisted of a telephone call and post-card reminders.

Another RCT of patients with foot infection, ulceration or prior amputation referred to a podiatry or vascular surgery clinic achieved a three-fold reduction in the amputation rate and ulceration rate (Malone et al, 1989). The intervention group received weekly or bi-monthly education including slide presentations and a simple set of patient instructions for the care of the diabetic foot.

One small RCT of people with diabetes failed to show a significant increase in knowledge about foot care or the status of the patient's feet, but the intervention group reported increase in proportion of people in inspecting and washing their feet on a daily basis (Kruger and Gutherie, 1992). The intervention group received additional participatory teaching\learning sessions that included actual foot washing, inspection and assessment; demonstration of care of corns and calluses, and cutting of toenails; identification of potential foot problems; and evaluation of suitable footwear. They also received a patient education kit.

A randomised controlled trial of patient education in insulin-treated diabetes failed to show any improvement in the foot-lesion score. However, in this study only 62% of patients attended seven or more of the nine sessions (Bloomgarden et al, 1987). In summary, the evidence shows that people with diabetes must have an examination of their feet and education about foot care.

- **The records show that at least annually, the patient's urine has been checked for albumin to detect early evidence of nephropathy.**

Unless good care is provided, nephropathy may eventually develop in as many as 35-45% of patients with IDDM and less than 20% NIDDM (Anderson et al 1983; Ballard et al, 1988). Development of proteinuria on dipstick testing heralds the onset of overt or clinical nephropathy. Development of renal dysfunction in diabetes may be predicted a decade in advance by the detection of small quantities or urinary albumin termed microalbuminuria (Mugensen and Christensen, 1984).

Recent studies have shown that treatment of patients with microalbuminuria using angiotensin converting enzyme (ACE) inhibitors slows progression to overt proteinuria. One German meta-analysis concluded that treatment of people with diabetes with ACE inhibitors not only reduces blood pressure but also reduces microalbuminuria/proteinuria and, in addition, exhibits an antihyper-glycaemic effect (Bergemann et al, 1992). Another meta-analysis showed that ACE inhibitors assert a specific antiproteinuric effect even without a change in systematic BP and they were more effective than other agents in treating microalbuminuria or overt proteinuria in initially normotensive or mildly hypertensive people with diabetes (Bohlen et al, 1994).

Factors contributing to the development of microalbuminuria in IDDM include the degree of glycaemic control, age or duration of IDDM, disturbed lipid profile, and possibly elevated blood pressure (Coonrod et al, 1993).

Microalbuminuria is defined as excretion of 30 - 300mg of albumin per day. Microalbuminuria in NIDDM has been found to be an independent risk factor for death due to cardiovascular disease (Neil et al, 1993). Diabetic renal disease is also associated with peripheral vascular disease and premature death (Rossing et al, 1996). It is therefore not surprising that the St Vincent Declaration pledges to reduce new cases of renal failure due to diabetes by one third or more within five years (St Vincent Joint Task Force, 1995). Development of renal disease is promoted by poor long germ glycaemic (Anonymous, 1993, Wang et al, 1993) elevated blood pressure (Fuller et al, 1996), and cigarette smoking (Couper et al, 1994).

Most standard dipsticks give positive results only when the rate of urinary albumin excretion is greater than 360mg per day (American Diabetes Association, 1994). Recently, products such as Micral (Boehringer-Mannheim) and microalbumin test (Ames) have been introduced to detect smaller amounts of albumin, although, their specificities are fairly low (Tiu et al, 1993). These tests are often used for initial screening, but, microalbuminuria is best diagnosed on the basis of quantitative assays (American Diabetes Association, 1994).

Early detection and effective treatment of diabetic renal disease is possible and progression of renal disease may also be slowed (Mogensen et al, 1995). A meta-analysis has shown long-term beneficial effects of anti-hypertensive agents on proteinuria and glomerular filtration rate (Maki et al, 1995). This study also showed that angiotensin-converting enzyme inhibitors and possibly nondihydropyridine calcium antagonists have additional beneficial effects on proteinuria that are independent of blood pressure reductions. Another meta-analysis showed that ACE inhibitors exert specific antiproteinuric effect and are superior to other agents in treating microalbuminuria or overt proteinuria in initially normotensive or mildly hypertensive people with diabetes (Bohlen et al, 1994). Studies have also demonstrated that screening for microalbuminuria is cost effective in people with Type 1 diabetes (Burch-Johnsen et al, 1993), but no similar analysis has been performed in Type 2 diabetes. The European guidelines recommend annual screening for microalbuminuria in patients with Type 1 diabetes of greater than five years duration (European IDDM Policy Group, 1993).

- **People with diabetes who smoke must be advised to stop smoking**

Cardiovascular disease causes around 65% of deaths in people with NIDDM (Andersson et al, 1995). One meta-analysis showed that compared with people without diabetes, the prevalence of smoking among people with diabetes is significantly higher (27% vs. 33%) (Dierkx et al, 1996) Metabolic control is worse in smokers compared with non-smoking diabetic patients. This study also concluded that anti-smoking strategies in people with diabetes are scarce and yield disappointing results.

Guidelines for the management of people with diabetes emphasise the importance of a healthy lifestyle that includes encouragement for smokers to give up smoking (RCGP, 1993; BDA, 1997; St. Vincent Task Force, 1995). The combination of mortality and morbidity in the general population is not dispersed, but the potential reduction in risk to be gained by stopping smoking has recently been demonstrated (Chaturvedi et al, 1997). From an international cohort study of over 4000 people with diabetes, they concluded that stopping smoking does reduce mortality risk in ex-smokers with diabetes, but the risk remains high several years after stopping and is highly dependent on the duration of smoking. Therefore people with diabetes who smoke must be encouraged to stop as soon as possible.

The multiple risk factor intervention trial (MRFIT) showed that with cigarette smoking, the cardiovascular mortality rate increased more steadily for men with diabetes than men without diabetes (Stamler et al, 1993). Risk Reduction for men with diabetes compared with those without ranged from 2.38 (smokers of 16-25 cigarettes/day) to 4.56 (non-smokers).

Another recent UK population-based cohort study from 10 practices with 917 people with diabetes followed up for eight years showed that the all cause mortality was higher for people with diabetes compared to age-sex matched controls (odds ratio 1.99, 95% confidence interval 1.6-2.47) and mortality from circulatory disease was significantly increased for people with diabetes (OR 2.0, 95% CI 1.5-2.6) (Gatling et al, 1997).

Yudkin calculated that stopping cigarette smoking would reduce coronary heart disease deaths by 15% over 10 years (Yudkin, 1993). This would be the most effective intervention in reducing the risk of coronary heart disease and would prolong life by a mean of around three years in diabetic men (Yudkin, 1993).

- **People with diabetes must have an annual assessment of their blood pressure and treatment given if blood pressure raised.**

Hypertension and diabetes are closely associated diseases which lead to an increased risk of cardiovascular disease (CVD). Hypertension is more frequent in people with diabetes compared to those without (Fuller et al, 1996) and it contributes significantly to the leading causes of morbidity and mortality in people with diabetes, including coronary heart disease, stroke, peripheral vascular disease, lower limb amputations and end stage renal disease (Fuller and Stevens, 1991; Fuller, 1996).

A recent Cochrane meta-analysis showed both short term (less than 12 months) and long term (greater than 12 months) benefit of antihypertensive treatment for total mortality in hypertensive people with diabetes (Fuller et al, 1997). The odds ratio for short-term total mortality was 0.64 (95% CI 0.5-0.83) and for long-term mortality 0.82 (95% CI 0.69-0.99) Data on long-term cardiovascular mortality and morbidity was only available for 2

trials (OR 0.82 95% CI 0.6-1.13). The authors concluded that their data for all cause and CVD mortality are taken from hypertension trials not specific to diabetes.

It has been estimated that in men with diabetes, a 10 year mortality from coronary heart disease of 14.4 per 1000 could be reduced to 8.6 per 1000 by antihypertensive treatment (Yudkin, 1993) in patients with diabetes.

Hypertension in people with diabetes is defined as blood pressure above 140/90 mmHg (Guidelines Sub-Committee, 1993).

Since the original literature review, results of UKPDS 38 (1998) showed clear evidence that tight control of blood pressure significantly lowers risk of microvascular and macrovascular complications in Type 2 diabetes. The results of UKPDS 38 are summarised below:

Intensive blood pressure control study (BP <150/85 vs <180/105). Over a median follow up of 8.4 years, there was a risk reduction of:

24% for any diabetes-related endpoint	$p < 0.005$	
32% for diabetes related death	$p < 0.02$	
44% for stroke	$p < 0.013$	
37% for micro-vascular disease	$p < 0.001$	
56% for heart failure	$p < 0.005$	
34% for retinopathy progression	$p < 0.004$	
47% for deterioration of vision	$p < 0.004$	

2.2. Organisation of multi-practice audits of diabetes in primary care

2.2.1 Introduction

Chapter One discussed the major reforms of the NHS and the introduction of MAAGs to encourage participation in audit of all general practitioners. However, studies have shown considerable variations in ways in which audit groups have promoted audit. A possible advantage of multi-practice audits are that they can familiarise large numbers of practices with the practicalities of audit. A further advantage is that the audit review criteria are uniform for all practices and therefore allow comparison of results. As many as 68 multi-practice audits of diabetes care relating to 1,611 practices had been carried out by 1993 (Baker et al, 1995). To date, however, little is known about how audit groups conduct multi-practice audits. This survey has the following purpose:

- To establish the quality of multi practice audits of diabetes to see whether they can be used more generally in the NHS to compare care between districts and,

- To identify strengths and weaknesses and support planning.

This study would also inform the choice of audit groups that would be selected for Stage I and Stage II of the thesis. As the results of this survey were to be used for the main thesis,only audits conducted since 1993 were included.

2.2.2 Aims

To investigate the approaches taken by audit groups in primary care in organising multi-practice audits of diabetes, and to identify the strengths and weaknesses of the methods being used.

2.2.3 Method

All 106 audit groups in England and Wales were asked whether they had undertaken a multi-practice audit of diabetes. This was undertaken by compiling information obtained in a previous survey (Baker et al, 1995) supplemented by a letter and return proforma sent to all audit groups which had not already reported undertaking an audit of this type.

A structured questionnaire was developed to capture information from the audit group on the conduct, design, methodology and organisation for each diabetes audit. The instrument included questions about

- methods used to encourage practice participation

- completion of the cycle

- level of audit group involvement in funding, planning, supporting and reporting on the audit

- the methods used for selecting audit criteria and for identifying and selecting patients

- the sources of data for the audit

- and standard setting.

All questions were in a closed format with multiple response choices. Copy of the questionnaires is enclosed in Appendix to Chapter Two.

To pilot the questionnaire, a workshop was held for local audit groups to discuss its contents. It was also sent to a convenience sample of six audit groups. Some revisions were made in the light of comments from groups. The pilots also revealed that audit groups were reluctant to share information about early audits as they felt they had been at

a learning stage and in consequence the organisation of audits was poorly conducted. The final questionnaire therefore asked only about audits conducted since January 1993.

The final questionnaire was posted to the audit group co-ordinators (or the equivalent lead person) of each audit group that had been identified as undertaking or completed a multi-practice audit of diabetes, together with a covering letter. Co-ordinators were asked to complete and return the questionnaire within a three-week time period. Co-ordinators were then followed up by a telephone call. Continuing non-responders were sent a reminder letter and an additional copy of the questionnaire. All returned questionnaires were edited and then entered into Epi Info.

2.2.4 Results

Forty-six audit groups out of the 106 had conducted a multi-practice audit of diabetes since 1993. A total of 24 completed questionnaires on the organisation of these multi-practice audits were returned by audit groups within the study period (December 1995 - April 1996), an overall response rate of 52.2%.

Practice participation in audit

The 24 audit groups were responsible for a total of 2130 practices (mean 88.8 practices per audit group; range 17-190) of which around one fifth were single-handed practices (Table 2.2).

TABLE 2.2 Size of practices (n= 3798).

Number of partners in practice	Proportion of practices (%)	Practices in England (%)*
One	378 (17.7)	30
Two – three	549 (25.8)	34
Four – six	563 (26.4)	30
Seven or more	108 (5.1)	6
Not known	532 (25.0)	

*(NHS Executive, 1997b)

However, not all practices had been invited to participate. Audit groups reported inviting 2039 practices (mean 85.0 practices per audit group; range 17-190 per audit group) to participate in the audit. Twenty (83.3%) audits included in the study were open to all practices, but, three (12.5%) were organised for selected practices within a specific locality. 720 (35.3%) practices invited to participate agreed to undertake the audit (a mean of 34.2 per audit group; range 10-84 per audit group) of which 668 practices went on to complete the audit by undertaking a one data collection (mean 31.8 per audit group). Groups used a variety of methods to encourage practices to participate (Table 2.3). Only a minority offered reimbursement of costs or some form of grant.

Funding

Twenty two (91.7%) audits were funded either wholly or in part by audit groups themselves. Five received funding from the local health authority. The regional health

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authority, district audit committee or the hospital did not fund any of the diabetes audits.

TABLE 2.3 Methods used to encourage practice participation in multi-practice diabetes audit (n=24)

Methods		Number of audits using method (%)	
Indirect:	Letter/mailshot	19	(79.2)
	Audit group newsletter	16	(66.7)
	Audit protocol sent to practice.	16	(66.7)
Direct:	Personal visit	13	(54.2)
	Launch meeting	8	(33.3)
	Telephone call	6	(25.0)
Incentive:	Postgraduate accreditation	6	(25.0)
	Reimbursement of costs	4	(16.7)

Planning and Support

The responsibility for detailed planning lay mostly with the audit group staff. In 17 (70.8%), leadership was provided primarily by the audit group chairperson. Other clinical professionals or managers were rarely involved as leaders but were more likely to have a supporting role. Audit support staff were involved in primary data collection for 21 (87.5%) of the audits reviewed, and in undertaking the data analysis for all the audits. In all other cases, practice staff were reported as responsible for data collection.

Criteria and Standards

Table 2.4 shows methods used for selecting audit review criteria. Many audit groups used a combination of methods for selecting audit criteria. Very few of the audits included in the study involved a systematic review of available literature. In 10 (41.7%), the audit groups left the practices themselves to decide on setting standards. The audit group was responsible for setting the standards for six (25.0%) and in a further eight (33.3%) no standards were set.

TABLE 2.4 Methods used for selecting diabetes audit criteria (n=24).

Method	Number of Audit Groups using method (%)	
Consultation with local specialists	14	(58.3)
Consultation with local GPs	12	(50.0)
National guideline/protocol	8	(33.3)
Local guideline/protocol	7	(29.2)
Literature review e.g. using Medline	4	(16.7)
Informal reference to literature	4	(16.7)
Lilly Centre audit protocol	4	(16.7)
Systematic literature review e.g. Effective Healthcare Bulletin	1	(4.2)
Consultation with patients	0	(0)

The Audit Design

Each group advocated a variety of methods to practices for identifying patients, and several sources of data were used (for example, paper or computer records) for extracting patient information. Advice was given to all practices within each audit group

and included: advice on identification of patients using a disease register in 14 multi-practice audits (58.3%), practice computer in 17 (70.8%), patient records in 12 (50.0%), repeat prescribing system in 12 (50.0%), age-sex register in seven (29.2%), and the hospital register in two (8.3%).

Advice on data extraction was standardised for each audit group including the use of patient records in 21 (87.5%), computer records in 18 (75.0%) and the hospital records in five (20.8%). Sixteen (66.7%) groups advised practices to select every patient and eight (33.3%) advised practices to select a sample of patients. When some form of sampling was undertaken, half (4/8) of the audit groups advised practices to undertake systematic sampling.

Feedback and Dissemination

Twenty-three (95.8%) groups reported that participating practices received feedback of results in an individualised practice feedback report. These reports were anonymised to allow the practice to compare their performance against their peers. Findings were presented to groups of participating practices in a general meeting in 10 (41.2%), or as part of a more specific educational meeting in 13 (54.2%). Feedback to practices by means of a practice visit by a representative from the audit group was undertaken in three (21.5%) of the audits. Table 2.5 shows the methods used to disseminate reports of multi-practice audits.

TABLE 2.5. Methods of disseminating diabetes audit findings to interested parties.

Method of dissemination	Number of audit groups (%)	
Audit group newsletter	16	(66.7)
Audit group annual report	14	(58.3)
Report to local health authority	11	(45.8)
Report to non-participating practices	9	(37.5)
Report to other audit groups	7	(29.2)
Seminar/workshop	7	(29.2)
Presentation at regional/national conference	3	(12.5)
Article in peer reviewed journal	1	(4.2)

Identifying and implementing change

In 10 (41.7%) audits, the audit group had not undertaken any follow-up action. In eight (33.3%), the group had made a personal visit to practices, in three (12.5%) the audit group had requested an action plan from practices and two (8.4%) audits were followed with a telephone call. Table 2.6 shows the actions the groups had undertaken or were planning to undertake as a result of the audit. Eighteen (75.0%) audit groups were aware of actions that the practices had undertaken or were planning to undertake as a result of the audit.

TABLE 2.6 Actions undertaken/planned by practices.

Actions undertaken/planned	Number of audits (%)
Offering to repeat data collection exercise	14 (58.3)
Discussion with local experts about local policies and interface audit	12 (41.7)
Provision of advice/suggestions/commentary on specific improvements which could be made	10 (41.7)
Revision of policy	7 (29.2)
Liaison with local experts (e.g. Chiropodists, optometrists, diabetes specialist nurses, opticians, dieticians or diabetologists).	6 (25.0)
Introduction of structured record card	5 (20.8)
Provision of education programme for GPs or teams	5 (20.8)
Introduction of computer record for the clinic	4 (16.7)
Support from other agencies e.g. British Diabetic Association.	3 (12.8)
Offering visits of a facilitator or specialist nurse or advised about seeking additional funding from the Health Authority to help certain practices	2 (8.3)
Seeking improved provision of nurses or other resources	2 (8.3)
Development of diabetes patient record card	2 (8.3)
No action undertaken/planned	3 (12.5)
Not aware of any actions	6 (25.0)

2.2.5 Discussion

This survey was designed to investigate the strengths and weaknesses of multi-practice primary care audits of diabetes being conducted by audit groups in England and Wales. Although the majority of audit groups were conducting this type of audit, only just over half were willing or able to provide details of their audits. Despite concerted efforts to allay fears over the confidentiality of information about the organisation of multi-practice audits, this evidently remained a concern for many groups. For other groups, problems were encountered in locating audit reports, particularly if the audit had been completed some time previously or if the staff responsible for the audit were no longer working with the group. The findings cannot be assumed to represent information about all multi-practice audits of diabetes. The audit groups who responded in this survey were self-selected and may therefore represent groups that have conducted a systematic audit. However, there was no difference in the number of practices in audit groups that responded and those that did not (Mann Whitney U 370, P = 0.87).

The findings confirm that some primary care audit groups have been coordinating diabetes multi-practice audits and were feeding back information to practices on a comparative basis. As a result of this approach, large numbers of practices have been involved in audits of diabetes care. However, there was considerable variation in the quality of audits.

Half the audits reviewed were reported by audit groups to have completed, or were in the process of completing, a second data collection. Most of the remaining groups reported having plans to complete the audit cycle in the future, but the proportion that will

eventually do so remains uncertain. Audit groups should concentrate on finishing the cycle to check that changes have been effective rather than simply facilitating participation and feeding back information to practices.

The survey also examined the levels of participation and methods used by audit groups to encourage it. Humphrey and colleagues (Hymphrey and Berrow, 1994) concluded that allocating a high priority to audit was difficult for practitioners due to the lack of dedicated time or resources. Bapna and colleagues (Bapna et al, 1994) also found that high workloads, and inadequate premises and facilities were major barriers to undertaking audit.

The findings from this survey showed that many practices were still not participating in multi-practice audits of this common chronic condition in primary care. However, some practices may have conducted their own audits and therefore may have decided that participation in a multi-practice audit would have been unnecessary. Around one third of practices did agree to take part, and even fewer were completing the audit to its first data collection stage. Audit groups need to use effective methods to encourage participation, for example audit facilitators have been found to successfully introduce practitioners to audit when they have explored the barriers and problems on an individual practice basis (Bapna et al, 1994). This study did not allow determination of the effect of funding or incentives on participation. However, a recent study showed that the number of audits per practice is independent of the level of funding of the audit group (Hearnshaw et al, 1998).

Although there are widely recognised recommendations about diabetes care, many groups were selecting criteria using informal methods. There are wide variations in the criteria chosen for audit of diabetes. However, if audit is to lead to worthwhile improvements in care, the criteria should be based on convincing research evidence (Baker and Fraser, 1995).

Variations in sampling techniques and sample sizes were also evident. To ensure confidence that an audit is a true measure of performance, adequate and reliable samples are required. It appears that greater awareness about sampling techniques is required among audit groups and their practices.

This survey demonstrated that audit groups were feeding back audit results to their practices. It is also encouraging that audit groups were using educational meetings to report audit findings for almost half of the audits reviewed, although practice visits from audit group members to discuss the results were rare. Few studies have measured the effects of feedback to general practices as a whole, although many have investigated the effects on individual practitioner behaviour. It has been suggested that feedback of information would be more appropriate at practice level in influencing service delivery (Roland et al, 1989). One study (Szczepura et al, 1994) concluded that feedback strategies using graphical and tabular comparative data are cost effective in general practice with about two thirds of practices reporting organisational change as a consequence. However, although comparative data from peers can be a powerful tool for encouraging positive changes in behaviour, they are not always effective (Szczepura et al, 1994). Feedback may be more likely to influence clinical practice if it is part of an

overall strategy which targets decision makers who have already agreed to review their practice (Mugford et al, 1991). The impact of feedback may be enhanced by an educational exercise or visit from a facilitator (Mugford et al, 1991; Harris et al, 1984; Horder et al, 1986). Therefore, audit groups should use a wider range of strategies to implement change.

This survey indicates that multi-practice audits can involve large numbers of practices, but efforts are required to improve the quality and effectiveness of these audits. The findings show that most multi-practice audits are not sufficiently rigorous to meet the new needs of clinical governance. These findings will be useful for those implementing clinical governance within PCGs. Organisers of multi-practice audits such as audit groups or PCGs should pay more attention to the selection of criteria, methods of identifying and sampling patients, data collection procedures, and methods for implementing changes in performance. Organisers of these multi-practice audits also need to develop a culture of openness to allow comparison of audit methods. This has implications for the training needs of organisers of multi-practice audits.

Appendix to Chapter Two

- Letter to attend workshop

- Newsletter for audit groups

- Letter to audit groups

- Data collection form for organisation of multi-practice audit data

- Evaluation forms for participating audit groups

Dear

Multi-practice diabetes and asthma workshop

Further to our telephone conversation I am writing to confirm the workshop that the Lilly Audit Centre will be running on Thursday October 12th 1995, and for which you expressed an interest.

The workshop forms part of a study which aims to assess the methods used by MAAGs to conduct diabetes and asthma audits and to determine the feasibility of collating and aggregating the results from these audits to provide comparative information between MAAGs.

It is hoped that the workshop will provide a forum in which you can meet with other local MAAG representatives involved in similar audits and where you will hear a series of short informal presentations of these audits undertaken by a selection of MAAGs. Particular issues of interest will include the organisation and design of the audit, the clinical criteria included in the audit and the general results. It is also hoped that the workshop will enable an exploration of the practicalities of collating audits and to establish strict and acceptable rules of confidentiality.

We would like to start the workshop at 12.30 pm and will be offering lunch from 12.00 noon in Seminar Room 1, Department of General Practice, Leicester General Hospital. We envisage the workshop will finish around 4.30 pm. At the workshop, you will also meet with Dr Kamlesh Khunti and Dr Mayur Lakhani, Clinical Lecturers at the Centre and local GPs, who are involved in this project.

I will send you a final workshop programme in the next couple of weeks, together with instructions and a map of where you can find us, in case you have not visited the Centre before. We will, of course, be happy to reimburse your travel expenses and a form for this will be given to you on the day. I will also telephone you prior to your visit to confirm final arrangements.

In the meantime, I would be grateful if you would send to us any relevant documentation that your MAAG has produced relating to these particular audits e.g. reports, results, newsletters, audit plans, data collection sheets and instructions so that we may review these in advance of the workshop.

We look forward to seeing you on October 12th.

Yours sincerely,

Moira Rumsey
Research Associate

ELI LILLY NATIONAL CLINICAL AUDIT CENTRE
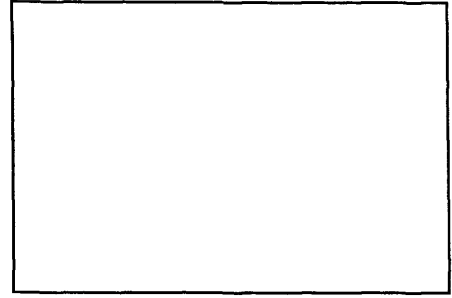
INTER-GROUP AUDIT

- a new service for MAAGs -

ELI LILLY NATIONAL CLINICAL AUDIT CENTRE

DEPARTMENT OF GENERAL PRACTICE

UNIVERSITY OF LEICESTER

INTER-GROUP AUDIT

A new service for MAAGs

The Lilly Audit Centre, with support from the Department of Health, is offering a new nation-wide exchange of *anonymised* multi-practice audit findings between MAAGs.

In the first instance, audits of diabetes and asthma will be included in the service.

In exchange for information from MAAGs on the organisation of their multi-practice audits and of practices' *anonymised* audit results, the Centre will provide each MAAG with feedback. This feedback, by means of an individualised report at no cost to the MAAG, will help MAAGs to:

> gain more complete information about the pattern of patient care for important clinical conditions;

> compare their performance with other anonymised MAAGs throughout the country;

> compare their practices' performance with other anonymised practices throughout the country;

> identify the strengths and weaknesses of local clinical care;

> help guide local service development;

> consider how other MAAG's audits are organised.

Why diabetes and asthma?

A previous study by the Centre identified diabetes and asthma as the most common topics for multi-practice audits, involving between 1500 and 2000 practices nationwide.

It is anticipated that the service will be developed in the future to include other important clinical conditions.

INTER-GROUP AUDIT

Data security guarantee

The Lilly Audit Centre recognises that confidentiality and anonymity of audit results are imperative to all MAAGs and practices.

In order to ensure that data security is guaranteed, rigorous measures are being taken by the Centre. These include:

- the provision of unique codes to MAAGs for identification purposes only;

- no information that could identify a practice will be held by the Centre;

- no disclosure of individual MAAG data to any third party that is identifiable to that MAAG;

- the inclusion in the MAAG report of anonymised comparative data;

- the provision of the MAAG report only to an agreed named individual from the MAAG.

What will MAAGs need to do?

MAAG audit coordinators are asked to provide their multi-practice audit information to the Centre.

A data collection instrument, designed for easy completion, gathers information on the organisation of the MAAG's multi-practice audit(s) and includes issues such as practice participation, audit design, methods of data collection, analysis and practice feedback.

MAAGs are also asked to provide, on paper, *anonymised* individual practice audit results. These should be easily extractable from the MAAG's audit database.

30 August 1995

Dear ,

Diabetes and Asthma Multi-Practice Audit Project

As you may be aware, a national study of medical audit advisory group activities undertaken last year by the Lilly Audit Centre for the Department of Health identified diabetes and asthma care as the most common topics for multi-practice audits (i.e. audits involving two or more practices). As a consequence, the Audit Centre has recently been commissioned by the Department to collate the findings of diabetes and asthma multi-practice audits to provide a substantial body of information about care for these two important conditions.

At the time of our earlier study, your MAAG was not identified as having been involved in any multi-practice audit relating to either diabetes or asthma. However, in order to ensure that we now have an up-to-date and correct record of all multi-practice audits of these conditions undertaken throughout England and Wales, I would be grateful if you would complete the page overleaf and return it in the pre-paid reply envelope provided by WEDNESDAY 13th SEPTEMBER 1995.

Should you require further information about the study, please do not hesitate to contact me.

Thank you in advance for your cooperation.

Yours sincerely

Moira Rumsey
Research Associate

ELI LILLY NATIONAL CLINICAL AUDIT CENTRE

ELI LILLY NATIONAL CLINICAL AUDIT CENTRE

Diabetes and Asthma Multi-Practice Audit Project

This is to confirm that ....(MAAG NAME)

(a) has*/has not* been involved in a multi-practice audit of **diabetes** care between 1991 - 1995;

(b) has*/has not* been involved in a multi-practice audit of **asthma** care between 1991 - 1995.

* Please delete as appropriate

Signed: ....

Job title: ....

Date: ____/____/1995

PLEASE RETURN THIS FORM TO THE ELI LILLY NATIONAL CLINICAL AUDIT CENTRE BY WEDNESDAY 13 SEPTEMBER 1995 IN THE PREPAID ENVELOPE PROVIDED.

THANK YOU FOR YOUR COOPERATION.

INTER-GROUP AUDIT SERVICE
- DIABETES -

a new service for MAAGs

Please tick the relevant boxes to indicate whether or not your MAAG would like to participate in the Inter-Group Audit Service for Diabetes. Please also complete the bottom section before returning it to the Lilly Audit Centre, Department of General Practice, Leicester General Hospital, Gwendolen Road, Leicester LE5 4PW.

1. **Would like to participate in the Inter-Group Audit Service for Diabetes by:**

a.   providing information on the organisation of our multi-practice
      diabetes audit(s).
      PLEASE COMPLETE AND RETURN THE ENCLOSED FORM   [   ]

b.   providing information on anonymised participating practices'
      diabetes audit findings and additional details by:

     (i)   completing Lilly Audit Centre data collection form   [   ]
     (ii)   providing a computer print out   [   ]
     (iii)   providing information on disk   [   ]
     (iv)   providing audit reports   [   ]
     (v)   Other method (please specify below)   [   ]

     _____

2.   **Would not like to participate in the Inter-Group Audit Service**
      for Diabetes   [   ]

NAME:_____

JOB TITLE: _____

MAAG: _____

ADDRESS:_____

_____

_____

POST CODE: _____   TEL NO:

_____

DATE: _____/19 _____

IF PARTICIPATING IN SERVICE: NAME OF MAAG INDIVIDUAL TO
RECEIVE MAAG REPORT:

MAAG CODE   [   ]
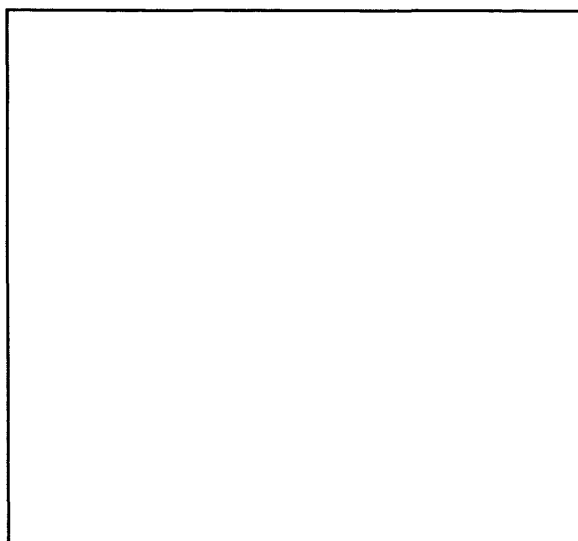
INTER-GROUP AUDIT

a new service for MAAGs

- DIABETES -

THE ORGANISATION OF THE AUDIT

ELI LILLY NATIONAL CLINICAL AUDIT CENTRE

DEPARTMENT OF GENERAL PRACTICE

UNIVERSITY OF LEICESTER

1. Title of audit project:_____

AUDIT PROGRESS

2. What stage of the audit cycle has this multi-practice audit reached?
   (PLEASE TICK ONE BOX)

First cycle not completed	[　]$_1$
First cycle completed, but no second cycle	[　]$_2$
Second cycle initiated, but not completed	[　]$_3$
Second cycle completed	[　]$_4$
Three or more cycles completed	[　]$_5$

2a. If first cycle 'not completed' or 'completed, but no second cycle': Are there plans to   undertake a second cycle?
   (PLEASE TICK ONE BOX)

Yes	[　]$_1$
No	[　]$_2$

2b. If no: Why not?

_____

_____

	First cycle (Month/Year)	**Second cycle** (if applicable) (Month/Year)
3. When did the audit commence?	_____/19___	_____/19___
4. When was the audit completed?	____/19_____	_____/19___

PRACTICE PARTICIPATION

5. How many practices in total is the MAAG responsible for?   _____

6. Of this total number, how many practices have:

1 partner	_____
2 - 3 partners	_____
4 - 6 partners	_____

7 or more partners   _____

Not known   _____

7. Was the intention of this multi-practice audit to include:
   (PLEASE TICK ONE BOX)

Practices within a specific locality (local-wide audit)   [$]_1$
Practices within the district/county (MAAG-wide audit)   [$]_2$
Practices within the region (region-wide audit)   [$]_3$

	First cycle	**Second cycle** (if applicable)
8. How many practices were invited to participate in this multi-practice audit?	_____	_____
9. How many practices agreed to take part?	_____	_____
10. How many practices completed the audit?	_____	_____

11. Of those who completed the audit, how many have:

	First cycle	**Second cycle**
1 partner	_____	_____
2 - 3 partners	_____	_____
4 - 6 partners	_____	_____
7 or more partners	_____	_____
Not known	_____	_____

12. How were practices encouraged to participate?
    (PLEASE TICK ONE OR MORE BOXES)

Reimbursement of costs   [$]_1$
Standard grant (please specify) _____   [$]_2$
PGEA accreditation   [$]_3$
Award/prize (please specify) _____   [$]_4$
Invited to a launch meeting   [$]_5$

Letter/Mailshot   [   ]$_6$
MAAG Newsletter   [   ]$_7$
Personal visit   [   ]$_8$
Telephone call   [   ]$_9$
Provided with audit protocol   [   ]$_{10}$
Other (please specify) _____ [   ]$_{11}$

NATURE OF AUDIT

13. Was this multi-practice audit part of an interface audit?
    (PLEASE TICK ONE BOX)

    Yes   [   ]$_1$
    No   [   ]$_2$

   13a If 'yes': Who initiated the audit?
        (PLEASE TICK ONE OR MORE BOXES)

        MAAG   [   ]$_1$
        Hospital services   [   ]$_2$
        Community services   [   ]$_3$
        Social Services   [   ]$_4$
        Other (please specify) _____ [   ]$_5$

   13b In addition to primary health care, has the multi-practice audit addressed
         (PLEASE TICK ONE OR MORE BOXES)

        Hospital services   [   ]$_1$
        Community services   [   ]$_2$
        Social services   [   ]$_3$
        Other (please specify)_____ [   ]$_4$

ORGANISATION OF AUDIT

A. RESOURCES

14. What were the sources of funding for this multi-practice audit?
    (PLEASE TICK ONE OR MORE BOXES)

        MAAG   [   ]$_1$
        FHSA or Health Commission   [   ]$_2$
        RHA   [   ]$_3$
        District Audit Committee   [   ]$_4$
        Trust Audit Committee   [   ]$_5$

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Not known   [   ]6
Other (please specify) _____   [   ]7

B. PLANNING

15a. Who has **led** the planning of this multi-practice audit (eg chaired the working group/advisory group)?

15b. Who has provided **additional support** for this multi-practice audit (eg been a member of the working group/advisory group)?

(FOR EACH, PLEASE TICK ONE OR MORE BOXES)

	a) Led	b) Additional support
MAAG Chair	[ ]1	[ ]1
MAAG GPs	[ ]2	[ ]2
MAAG support staff	[ ]3	[ ]3
Other GPs	[ ]4	[ ]4
Other primary health professional(s)	[ ]5	[ ]5
Nurse specialist(s)	[ ]6	[ ]6
Hospital Consultant(s)	[ ]7	[ ]7
Other secondary health professional(s)	[ ]8	[ ]8
Public Health representative(s)	[ ]9	[ ]9
FHSA (HC) representative(s)	[ ]10	[ ]10
LMC representative(s)	[ ]11	[ ]11
RHA representative(s)	[ ]12	[ ]12
Service user(s)	[ ]13	[ ]13
CHC representative(s)	[ ]14	[ ]14
Other(s) (please specify)_____	[ ]15	[ ]15

C. AUDIT SUPPORT

16. Who has been responsible for undertaking the **primary data collection** (excluding data entry) for this multi-practice audit?
(PLEASE TICK ONE OR MORE BOXES)

Practice staff	[ ]1
MAAG support staff	[ ]2
Other (please specify) _____	[ ]3

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17. Who has been responsible for undertaking the **data analysis** for this multi-practice audit?
    (PLEASE TICK ONE OR MORE BOXES)

    Practice staff   [   ]₁
    MAAG support staff   [   ]₂
    Other (please specify) _____   [   ]₃

D. FEEDBACK

18. How have the audit results been fed back to participating practices?
    (PLEASE TICK ONE OR MORE BOXES

    Report to each practice   [   ]₁
    Visit to individual practices   [   ]₂
    Presentation of results to a group of practices   [   ]₃
    As part of an educational meeting (including PGEA) [   ]₄
    Other (please specify) _____   [   ]₅

19. In what other ways have the findings from this multi-practice audit been disseminated?
    (PLEASE TICK ONE OR MORE BOXES)

    Report to non-participating practices   [   ]₁
    Report to local health commission   [   ]₂
    Report to other MAAGs   [   ]₃
    Article in peer reviewed journal   [   ]₄
    MAAG newsletter   [   ]₅
    MAAG annual audit report   [   ]₆
    Presentation at regional/national conference   [   ]₇
    Seminar/workshop   [   ]₈
    No other ways of dissemination   [   ]₉
    Other (please specify)_____   [   ]₁₀

IMPLEMENTING CHANGE

20. What steps have the MAAG taken to find out what practices are doing or planning to do to improve care as a result of the audit findings?
    (PLEASE TICK ONE OR MORE BOXES)

    Required action plan from practices   [   ]₁
    Personal visit   [   ]₂
    Telephone call   [   ]₃

No steps taken   [ ]₄
Other _____ [ ]₅

21. What general problems or aspects of care requiring improvement have been identified as a result of the audit?
(PLEASE TICK ONE OR MORE BOXES)

Problem with record keeping	[ ]₁
Problem with DNAs	[ ]₂
Lack of expertise in Fundoscopy	[ ]₃
Lack of information from hospital letters	[ ]₄
Lack of services such as chiropody, dietitian	[ ]₅
Lack of time	[ ]₆
No clinical care protocol	[ ]₇
Lack of knowledge in managing diabetes	[ ]₈
No general problems identified	[ ]₉
Others (please specify): _____	[ ]₁₀

22a. From the findings of this multi-practice audit, what action(s) has the **MAAG** undertaken or is the MAAG planning to undertake?
(PLEASE TICK ONE OR MORE BOXES)

b. FOR EACH ACTION N/PLANNED: For what proportion of participating practices is the MAAG undertaking this action?
(PLEASE TICK ONE BOX)

	a)	b) Proportion of participating practices		
		All	Most	Some
Provided advice/suggestions/commentary on specific improvements which could be made	[ ]₁	[ ]₁	[ ]₂	[ ]₃
Provided an educational programme for GPs or teams	[ ]₂	[ ]₁	[ ]₂	[ ]₃
Sought improved provision of nurses or other resources	[ ]₃	[ ]₁	[ ]₂	[ ]₃
Discussed with local experts about local policies and interface audit with hospital diabetic team	[ ]₄	[ ]₁	[ ]₂	[ ]₃
Offered visits of a facilitator or diabetes specialist nurse, or advised about seeking additional funding from the FHSA (HC) to help certain practices	[ ]₅	[ ]₁	[ ]₂	[ ]₃
Developed a local diabetes patient held record card	[ ]₆	[ ]₁	[ ]₂	[ ]₃

Offered to repeat the data collection exercise	[ ]₇	[ ]₁	[ ]₂	[ ]₃

No action undertaken or planned   [ ]₈

Other (please specify): _____	[ ]₉	[ ]₁	[ ]₂	[ ]₃
_____	[ ]₁₀	[ ]₁	[ ]₂	[ ]₃

23a. From the findings of this multi-practice audit what actions have **practices** undertaken or are
        they planning to undertake?
        (PLEASE TICK ONE OR MORE BOXES)

   b. FOR EACH ACTION BEING UNDERTAKEN/PLANNED: What proportion of
       participating practices are undertaking this action?
       (PLEASE TICK ONE BOX)

	a)	b) Proportion of prarticipating practices		
		All	Most	Some
Provision of educational programme for GPs and nurses	[ ]₁	[ ]₁	[ ]₂	[ ]₃
Revision of policy for diabetic care	[ ]₂	[ ]₁	[ ]₂	[ ]₃
Introduction of structured record card	[ ]₃	[ ]₁	[ ]₂	[ ]₃
Introduction of computer record for the diabetic clinic	[ ]₄	[ ]₁	[ ]₂	[ ]₃
Liaison with local chiropodist, optometrist, optician dietitian, diabetes specialist nurse, diabetologist	[ ]₅	[ ]₁	[ ]₂	[ ]₃
Support from other agencies such as the British Diabetic Association or it local branch	[ ]₆	[ ]₁	[ ]₂	[ ]₃
Not aware of any actions undertaken/planned	[ ]₇			
Others (please specify): _____	[ ]₈	[ ]₁	[ ]₂	[ ]₃
_____	[ ]₉	[ ]₁	[ ]₂	[ ]₃
_____	[ ]₁₀	[ ]₁	[ ]₂	[ ]₃

THE AUDIT DESIGN

24. How have practices been advised to identify patients for inclusion in this multi-practice
    audit?
    (PLEASE TICK ONE OR MORE BOXES)

Age/Sex register	[ ]$_1$
Disease register	[ ]$_2$
Patient records	[ ]$_3$
Practice computer	[ ]$_4$
Repeat prescribing system	[ ]$_5$
District register	[ ]$_6$
Hospital register	[ ]$_7$
Other (please specify) _____	[ ]$_8$

25. Which specific patient groups have practices been advised to include in this multi-practice audit?
    (PLEASE TICK ONE OR MORE BOXES)

    a.   <u>Type of diabetes:</u>

              Insulin dependant diabetics (IDDM)   [   ]$_1$

              Non-insulin dependent diabetics (NIDDM)   [   ]$_2$

    b.   <u>Type of patient care:</u>

              Diabetics attending hospital only   [   ]$_3$

              Diabetics attending GP practice only   [   ]$_4$

              Diabetics attending shared care   [   ]$_5$

    c.   <u>Age:</u>

              All ages   [   ]$_6$

              Adults (please specify age range) _____   [   ]$_7$

              Children (please specify age range) _____   [   ]$_8$

    d.   Other (please specify) _____   [   ]$_9$

---

26. What method have practices been advised to use to select patients, once identified?
    (PLEASE TICK ONE OR MORE BOXES)

    Every patient   [   ]$_1$

    A sample   [   ]$_2$

    None   [   ]$_3$

    Other (please specify) _____   [   ]$_4$

    If 'a sample' used:

    26a. What sampling method have practices been advised to use?
           (PLEASE TICK ONE OR MORE BOXES)

              Systematic sample (eg 1 in every 10 patients)   [   ]$_1$

              Random numbers using a table   [   ]$_2$

              Random numbers using a calculator   [   ]$_3$

              Random numbers using a computer software package [   ]$_4$

              Other (please specify) _____   [   ]$_5$

    26b. Has a sample size calculation been undertaken?
           (PLEASE TICK ONE OR MORE BOXES)

              Yes, by MAAG   [   ]$_1$

              Yes, by practice   [   ]$_2$

Yes, by other (please specify) _____ [ ]₃

No [ ]₄

6c. *If yes:* What sample size calculation method has been used?
(PLEASE TICK ONE OR MORE BOXES)

EpiInfo	[	]₁
Statistician	[	]₂
Consulted statistics text book	[	]₃
Standardised sample size calculation	[	]₄
eg Lilly Centre audit protocol	[	]₅
Other (please specify) _____	[	]₆

26. What sources of data were practices advised to use to collect the information for this multi-practice audit?   **(PLEASE TICK ONE OR MORE BOXES)**

Disease register	[	]₁
Patient records	[	]₂
Practice computer	[	]₃
District register	[	]₄
Hospital data	[	]₅
Other (please specify) _____	[	]₆

_____

28. How did the MAAG select the audit criteria for this multi-practice audit?
(PLEASE TICK ONE OR MORE BOXES)

No explicit criteria selected []₁

National guideline/protocol (please specify) _____ [ ]₂

Lilly Centre audit protocol []₃

Local guideline/protocol (please specify) _____ [ ]₄

*Systematic literature review used by audit team
(eg using Effective HealthCare Bulletin) [ ]₅

*Literature review undertaken by audit team
(eg using recognised database such as Medline) [ ]₆

*Informal reference to literature undertaken by audit team
(eg not using recognised database such as Medline)

[ ]₇

Consultation with local GPs	[	]₈
Consultation with local specialists	[	]₉
Consultation with patients	[	]₁₀
GP practices chose own criteria	[	]₁₁
Other _____	[	]₁₂

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Q28a If 'systematic literature review', 'literature review' or 'informal reference to literature' undertaken:

Was this undertaken for.....
(PLEASE TICK ONE BOX)

All audit criteria	[ ]$_1$
Most audit criteria	[ ]$_2$
A few audit criteria	[ ]$_3$

29. Who set the standards for this multi-practice audit?
(PLEASE TICK ONE OR MORE BOXES)

No standards set	[ ]$_1$
Practices set own standards	[ ]$_2$
Practices set a common standard	[ ]$_3$
MAAG set standard	[ ]$_4$
Other _____	[ ]$_5$

30. What do you consider have been the strengths of this multi-practice audit?

_____

_____

_____

31. What do you consider have been the weaknesses of this multi-practice audit?

_____

_____

_____

32. Are you planning to repeat this audit in the future?

Yes	[ ]$_1$
No	[ ]$_2$

32a. *If yes*: What plans are there to alter the audit (eg. changes in criteria or data collection methods)?

_____

_____

_____

33. Has your MAAG had any discussions with the FHSA (HC) about the audit element of the Chronic Disease Management Programme for Diabetes?
(PLEASE TICK ONE BOX)

Yes	[	]₁
No	[	]₂
Not known	[	]₃

34. Is your MAAG involved in your local Diabetes Services Advisory Group (or equivalent)?
(PLEASE TICK ONE BOX)

Yes	[	]₁
No, MAAG not involved	[	]₂
No, no local Diabetes Services Advisory Group	[	]₃
Not known	[	]₄

35. Do you believe that the MAAG has a role in creating a District Diabetes Register?
(PLEASE TICK ONE BOX)

Yes	[	]₁
No	[	]₂

36. Why do you believe that?

_____

_____

_____

THANK YOU FOR COMPLETING THIS FORM. PLEASE RETURN THIS FORM TO THE LILLY AUDIT CENTRE, TOGETHER WITH THE AUDIT REPORT(S).

CLINICAL GOVERNANCE RESEARCH & DEVELOPMENT UNIT

DIABETES AND ASTHMA MULTI-PRACTICE AUDIT PROJECT

QUESTIONNAIRE EVALUATION FORM

Thank you for helping the Lilly Audit Centre to pilot the questionnaire. If there are any comments you would like to make with regard to particular questions or anwers in the draft questionnaire, please feel free to write these on the questionnaire itself. In addition to completing the questionnaire, we would very much appreciate your completing this evaluation form which will greatly assist us in determining what you think about the questionnaire itself and what improvements might be made.

1. How long did it take you to complete the questionnaire? _____ mins

2. How would you rate the ease or difficulty of providing your responses to this questionnaire?
(PLEASE TICK ONE BOX)

   Very easy[ ]   Easy [ ]   Neither easy[ ]   Difficult[ ]   Very   difficult[
                                                                       ]
                                  nor difficult

3. How good or poor would you rate the **structure** of the questionnaire?
(PLEASE TICK ONE BOX)

   Very good[ ]   Good[ ]   Neither good[ ]   Poor[ ]   Very poor[ ]
                                 nor poor

4. How good or poor would you rate the **content** of the questionnaire?
(PLEASE TICK ONE BOX)

   Very good[ ]   Good[ ]   Neither good[ ]   Poor[ ]   Very poor[ ]
                                 nor poor

5. How good or poor would you rate the **layout** of the questionnaire?
(PLEASE TICK ONE BOX)

   Very good[ ]   Good[ ]   Neither good[ ]   Poor[ ]   Very poor[ ]
                                 nor poor

6. What improvements, if any, would you suggest to improve......

a. **The structure**

_____

_____

_____

b. **The content**

_____

_____

_____

c. **The layout**

_____

_____

_____

THANK YOU VERY MUCH FOR COMPLETING THE QUESTIONNAIRE AND THIS QUESTIONNAIRE EVALUATION FORM.

PLEASE RETURN BOTH OF THESE TO THE ELI LILLY NATIONAL CLINICAL AUDIT CENTRE IN THE PREPAID ENVELOPE SUPPLIED BY FRIDAY 27 OCTOBER 1995

CHAPTER THREE:

PREVALENCE, TREATMENT AND QUALITY OF CARE

OF PEOPLE WITH DIABETES IN PRIMARY CARE

(STAGE I)

3.1. A study to estimate the prevalence and treatment of diabetes

3.1.1 Introduction

Many studies have been published reporting prevalence rates of diabetes. However, estimates have differed considerably depending on the methods used to determine prevalence. Furthermore, despite the large number of studies, previous estimation of prevalence have been carried out on a relatively small number of patients (Neil et al, 1987; Gatling et al, 1988; Mather and Keen, 1985, Williams et al, 1990; Gibbins and Saunders, 1989; Carney and Helliwell, 1995; Higgs et al, 1992; Barnett et al, 1992; Meadows, 1995) involving only a few general practices. Some recent studies have involved relatively larger numbers of people with diabetes (Dunn and Bough, 1996; Howitt and Cheales, 1993; Benett et al, 1994) but these have been carried out in single geographical regions. Prevalence estimations from single geographical areas may not be representative of the general population and may fail to identify areas of high prevalence that might need additional support to ensure equity of provision.

Chapter One and Chapter 2.2 have shown that a large number of multi-practice audits are being carried out in primary care. These audits, particularly of chronic diseases, require development of a register of patients with the condition being audited. Potentially multi-practice audits would be a very powerful and efficient method for estimating prevalence of a disease. Although such multi-practice audits may have weaknesses, if the identification of cases has been undertaken systematically, they would provide data of use to commissioners and planners. They would provide a method for planning future health care needs and re-audit data would allow monitoring of long term trends in prevalence. Further

more, if prevalence estimations determined using multi-practice audit data are similar to other studies of prevalence, the result would provide validation of, and support for making more use of multi-practice audit data.

3.1.2 Aims

1. To collate and estimate the national prevalence of diabetes using data from a national sample of multi-practice audits

2. To compare our results with prevalence rates and treatment from previous surveys.

3. To identify the methodological issues to consider when collating audit data to estimate disease prevalence.

3.1.3 Method

Recruitment

A comprehensive list of audit groups which had co-ordinated multi-practice audits of diabetes was constructed using information from a survey of audit groups undertaken in 1993 supplemented by a survey of all those groups which either did not respond to the first survey, or which had responded but had reported that they had not undertaken a diabetes audit. This has been described in detail in Chapter 2.2.

A data collection form was produced and requested details of diabetes treatment, number of patients included in the audit, and the total number of patients in the practices. The data collection form was piloted in six audit groups prior to being sent to all groups which had undertaken a multi-practice diabetes audit. A reminder and a second set of data collection forms were sent to non-responders and they were also followed up by a telephone call. The

results were transferred to summary sheets. To ensure optimum data quality, audit group staff were asked to verify the information and to provide any missing data. Returned data were reviewed independently by two members (KK and Research Assistant) of the project team and transferred to a data base.

Criteria for inclusion

Criteria for inclusion of multi-practice audits have to be developed in view of the variability of how these are conducted and how patients are selected (Chapter 2.2). The criteria for inclusion of the multi-practice audits in this study were as follows:

Diagnosis of diabetes mellitus

Data were included if the audit group had conducted the multi-practice audit on all patients with diabetes in the practice. Audits were excluded if they had included only a sub-set of patients with diabetes, for example, only those with non-insulin dependent diabetes mellitus (NIDDM) or insulin dependent diabetes mellitus (IDDM). Since criteria for classifying diabetes as insulin dependant vary, patients were classified according to treatment (insulin, oral hypoglycaemic drugs only or diet only).

Representative population

Although studies of specific groups (for example, groups classified by ethnicity or deprivation) yield useful information about prevalence, only a population-based study can provide rates suitable for comparison between audits (Chesover et al, 1991; Malmgren et al, 1987) Audits that included only patients in specific groups or ages were therefore excluded.

Accurately defined denominator

Information on the population at risk had to be available so that appropriate denominators could be used to estimate the prevalence. Age and sex information was not generally available for either the population with diabetes or the practice population .

Large populations

Small practice numbers in an individual multi-practice audit may signify a high degree of self-selection by involved practices. If audits involving few practices have systematically included those with higher or lower prevalence than average, this could represent a potent source of bias. Therefore, only multi-practice audits which had more than 1,000 people with diabetes were included in this study. This figure was arbitrary and based on the assumption that audits with small numbers of patients may include a biased sample of practices.

Audits conducted for similar periods

Prevalence rates over different periods cannot be easily compared with each other. The longer the time over which rates are averaged, the more they will reflect secular trends (Hennekens and Buring, 1987). Only data on multi-practice audits completed between 1993 and 1995 were collated.

The multi-practice audit data satisfying these inclusion criteria were merged to create a single pooled data set. For comparison of prevalence rates with other studies a Medline search from 1986-1996 was conducted to identify previous community-based surveys in the United Kingdom which reported total prevalence and treatment of known diabetes. Search terms included diabetes mellitus, prevalence, and treatment (Box 3.1). Any cross-references

from these studies were also included. Only studies that estimated the prevalence of all known diabetes (Type 1 and Type 2) conducted in the United Kingdom were identified.

3.1.4 Results

Prevalence of diabetes

Twenty-five audit groups supplied data from multi-practice audits of diabetes out of 58 that had completed the first cycle of a diabetes audit (43%). Of the 25 audit groups that supplied the data, only 7 (28%) multi-practice audits involving 259 practices provided data on the denominator. Complete data on the number of partners was known for three audit groups comprising 90 (35.1%) practices: 16 (17.8%) were single handed, 70 (77.8%) had 2-6 partners and four (4.4%) had seven or more partners. All seven audits fulfilled all other inclusion criteria for prevalence estimation. Data from other audit groups could not be used because they were audits of the structure of care, data were supplied as bar chart percentages, or they were conducted on specific sub groups. Three audit groups were from the north and three from the south of England, and one was from Wales.

The overall prevalence of diabetes in our study involving a total population of 1,475,512 people was 1.46%. There was considerable variation in prevalence between the 7 groups with rates ranging from 1.18% to 1.66%. This variation was highly statistically significant and so cannot be attributed to random variation (χ^2 308, df 6, $p < 0.0001$). Four audit groups supplied the data for the sex distribution of diabetes mellitus, giving an overall male to female ratio of 1.15:1. Audit groups used various methods of identifying people with diabetes (Table 3.1). Table 3.2 shows the prevalence of known diabetes in other recently published community studies.

**BOX 3.1 Search Strategy used for identifying studies of diabetes
prevalence and treatment**

Prevalence

1. Diabetes mellitus
2. Diabetes mellitus, insulin dependent
3. Diabetes mellitus, non insulin – dependent
4. Diabetes mellitus.t.w.
5. 1 or 2 or 3 or 4
6. Limit 5 to human
7. Limit 6 to english language
8. Prevalence
9. Prevalence.t.w.
10. 8 or 9
11. 7 and 10
12. Treatment
13. Treatment.t.w.
14. 12 or 13
15. 7 and 14

TABLE 3.1 - Prevalence of diabetes estimated for seven Audit Groups

Audit group	Year audit completed	Number of practices undertaking audit	Total number of patients	Total number of patients with diabetes	Male:Female ratio	% Prevalence of diabetes (95% confidence interval)	Methods used for identifying patients with diabetes
A	1995	33	197,246	2,702	1.07 : 1	1.37 (1.32-1.42)	a,b,c,d,e,f
B	1995	29	145,056	2,283	1.18 : 1	1.57 (1.51-1.64)	a,b,c
C	1995	39	257,364	3,541	1.22 : 1	1.38 (1.33-1.42)	a,b,c,d,e,f
D	1995	33	117,447	1,923	NR	1.64 (1.57-1.71)	a,b,c,f
E	1994	41	218,492	2,574	1.1 : 1	1.18 (1.13-1.23)	Practices responsible for identifying patients
F	1993	21	138,746	1,881	NR	1.36 (1.30-1.42)	a,b,c,f
G	1993	63	401,161	6,671	NR	1.66 (1.62-1.70)	b,c

NR = Not Reported
a   Disease register
b   Patient records
c   Computer records
d   District register
e   Hospital register
f   Repeat prescriptions

TABLE 3.2 - Prevalence studies of known diabetes (Type 1 and Type 2) in total populations from 1986-1996

Study	Year study undertaken	Number of people with diabetes	Number of practices	Method of identifying diabetic patients	Prevalence %	Range
Norwich (Williams et al, 1990)	1987	590	8	GP notes, prescriptions	1.28	NR
Powys (Gibbins and Saunders, 1989)	1989	469	NR	GP registers	1.01	NR
Tyneside (Carney and Helliwell, 1995)	1991	668	12	GP registers/records	1.30	NR
Trowbridge (Higgs et al, 1992)	1992	405	NR	GP and hospital registers	1.31	NR
Islington (Burnett et al, 1992)	1992	4,674	NR	GP and hospital registers PPA returns	1.17	NR
Bristol (Meadows, 1995)	1992-3	1,082	8	Observational data from practices	1.51	1.31-2.29
Poole (Dunn and Bough, 1996)	1992-3	4,130	36	GP records	1.60	0.8-2.6
Tunbridge Wells (Howitt and Cheales, 1993)	1993	2,574	41	GP registers	1.18	NR
Manchester (Bennett et al, 1994)	1993	3,463	64	GP records	1.20	0.49-2.15
RCGP Practices (Fleming, 1994)	1993	5,678	48	Network of sentinel general practices	1.60	1.2-2.8
North Tyneside (Whitford et al, 1995)	1994	559	NR	District diabetic register	1.80	NR

NR = Not reported

Pattern of diabetes care

Treatment of diabetes could be ascertained for 10 (40%) audit groups comprising 23,423 patients from 319 practices (Table 3.3).

TABLE 3.3 - Treatment of diabetes for 10 Audit Groups*

Audit group	Total number of patients (%)		
	Diet alone	**Oral hypoglycaemic drugs**	**Insulin**
A	687 (27.2)	1134 (44.9)	706 (27.9)
B	624 (27.4)	1064 (46.8)	587 (25.8)
C	814 (23.2)	1771 (50.5)	921 (26.2)
E	424 (16.5)	1326 (51.5)	824 (32.0)
F	257 (17.6)	815 (55.8)	389 (26.6)
G[†]	422 (22.7)	959 (51.6)	477 (25.7)
H	529 (23.0)	1197 (52.0)	576 (25.0)
I	313 (25.6)	591 (48.4)	317 (26.0)
J	353 (26.9)	580 (44.1)	381 (29.0)
K	1052 (24.0)	1914 (43.6)	1419 (32.4)

*Treatment for 638 patients not known.

[†]Systematic sampling used.

Table 3.4 shows the treatment of diabetes from our collated audit data in comparison with other recently published studies. Overall 23.4% were controlled by diet alone, 48.5% were being prescribed oral hypoglycaemic drugs and 28.2% were treated with insulin.

TABLE 3.4 - Treatment of diabetes in previous studies compared to that of pooled audit data. Values are percentages

Study	Year study undertaken	Number of diabetic patients in study	Treatment		
			Diet alone	Oral hypoglycaemic drugs	Insulin
London (Chesover et al, 1991)	1988	378	17.0	46.0	35.0
Poole (Gattling et al, 1988)	Not reported*	917	20.1	40.4	39.5
Powys (Gibbins and Saunders, 1989)	1989	469	16.0	54.0	30.0
Dudley (Parnell et al, 1993)	1989-90	452	21.7	53.3	25.0
Tyneside (Carney and Helliwell, 1995)	1991	668	23.5	47.0	28.7
Trowbridge (Higgs et al, 1992)	1992	405	19.0	51.0	30.0
Bristol (Meadows, 1995)	1992-3	1,082	28.7	46.1	25.1
Poole (Dunn and Bough, 1996)	1992-3	4,130	23.2	45.6	30.4
Tunbridge Wells (Howitt and Cheales, 1993)	1993	2,574	16.5	51.5	32.0
Collated audit data	1993-5	23,423	23.4	48.5	28.2

* Study Published in 1988

3.1.5 Discussion

The prevalence of known diabetes in this study of nearly 1.5 million people from 259 practices was 1.46% which is similar to the rates found in recent large studies (Benett et al, 1994; Fleming, 1994). However, some recent surveys in single geographical regions have reported higher prevalence rates (Dunn and Bough, 1996; Whitford et al, 1995). The study by the RCGP research practices (Fleming, 1994) showed a prevalence of 1.6%. This was based on 5,678 people with diabetes from 48 different practices who are particularly motivated, providing weekly returns to the Royal College of General Practitioners (Fleming et al, 1991). These practices are larger and employ more trainee doctors and have younger doctors than the national average (Office of Population Census and Surveys, 1995). The prevalence of 1.8% in the study in Tyneside (Whitford et al, 1995) was based on only 559 people with diabetes. The prevalence in Poole and Bristol were higher because these are practices that have previously participated in audit and had already developed diabetes register. The population of Poole is slightly more aged than the national average (Dunn and Bough, 1996) and the Bristol study only included eight group practices (Meadows, 1995). Practices in this present multi-practice audit were more representative practices for UK and many were participating in the audit for the first time. Previous surveys have been carried out in single geographical areas and may not therefore be generalisable to the UK as a whole. Our results from seven geographically different populations may therefore provide a better estimate of current prevalence in the UK.

The percentage of people with diabetes treated by diet alone in previous surveys has ranged from 16.0 to 28.7% (Table 3.4). For oral hypoglycemic drugs the range has been 40.4 to 54.0% and for insulin 25.0 to 39.5%. The results in our study are therefore comparable.

This study also identified the slightly higher prevalence rate of diabetes mellitus in males that has been observed in previous studies (Howitt and Cheales, 1993; Fleming, 1994; Whitford et al, 1995). The validity of prevalence rates from multi-practice audit data are therefore supported by the higher prevalence, and similar treatment and gender rates to those of previous studies.

Issues which merit further consideration are the possible causes of bias in this type of data collection and the possible reasons for the significant variation in prevalence and treatment patterns in different areas.

Sources of potential bias

To estimate the prevalence of a disease, it is important to study a large unbiased population sample. In collating audit data, sources of bias may include information bias, diagnostic and ascertainment bias and selection bias (Hennekens and Buring, 1987).

Information bias may arise from inaccurate data collection. Retrieval of data can be difficult and must be carried out by someone with experience of general practice records. It is difficult to confirm details of audits and accuracy of the diabetes registers of individual practices and a major limitation in collation of audit data may be poorly conducted primary data collection.

Diagnostic bias occurs if, for example, participating practices have categorised a higher proportion of their population as diabetic through use of incorrect diagnostic criteria, opportunistic screening for glycosuria or a lower clinical threshold for diagnostic testing.

Ascertainment bias may occur if different methods are used to identify individuals with diabetes for audit purposes in different areas. The methods used in these audits for identifying patients with diabetes are comparable to the methods used in previous studies. However, it was not possible in our survey to check the validity of the diagnosis of patients reported to have diabetes.

Selection bias will occur because of the self-selection of practices that undertake multi-practice audits and in the selection of audit groups that provide data and have appropriate data for comparison or aggregation. Complete data on number of partners was only known for just over a third of practices. However, our study of quality of care of people with diabetes did show that the practices (Chapter 3.2) represented the expected range of partnership size except for under representation of single handed practices (Department of Health, 1994). However, there is also some evidence that the practices that do not provide structured care (and are probably less likely to contribute to multi-practice audit) may differ systematically in terms of prevalence (Goyder et al, 1996).

All these potential biases would be reduced by an increase in the standardisation of the methods used in multi-practice audits and the inclusion of a large number of practices. The data would then be more directly comparable and the practice populations more representative of the whole population.

Explanation of variations between multi-practice audits

Despite the potential for bias, the large variations observed are also likely to reflect real geographic differences in prevalence and treatment patterns. Variations could be due to

demographic differences between populations. This study has reported crude rates and comparisons are therefore difficult because age-specific and age-adjusted rates could not be ascertained. However, individual patient audit data would allow estimation of age specific prevalence and treatment of patients with diabetes. Rates also vary appreciably between ethnic groups (Simmons et al, 1991) and with deprivation (Meadows, 1995). Investigation of these issues are not usually possible when aggregating multi-practice audit data as they are conducted currently but comparison can highlight unexpected differences or local deficiencies in care which merit further investigation. Thus, such data may act as a stimulus for improvement in care with the potential for reduction in inequality. These data may also assist local purchasing and providing bodies with service development.

There is evidence over the past decade that the number of people with diabetes has increased (Ruwarrd et al, 1993) and in planning future health care, monitoring of trends such as prevalence and incidence is a necessary pre-requisite. Aggregated audit data from comparable audits can be one way of monitoring such trends. The findings in this survey are consistent with the secular rise in the prevalence of diagnosed diabetes that has been observed previously (Neil et al, 1987). However, it is not possible to be sure to what extent the increase is due to improved detection. Only population surveys which assess the prevalence of undiagnosed diabetes can distinguish increases in true prevalence from improved detection rates. Nevertheless, comparison of audits over time could provide useful evidence of local and national secular trends.

The creation of continuous morbidity registers to obtain data of sufficient quality for epidemiological purposes has been proposed previously (Flemming, 1994). Burnett and

colleagues (1992) concluded that the task of developing district diabetes registers may prove a major task in many inner city health districts. It has been argued that the identification of all people with diabetes is within the competence of GPs and audit groups may have a role in co-ordinating annual identification of patients and evaluating the care that they receive within the district (Howitt and Cheales, 1993).

This study shows that the method used in this survey is practical and suitable for epidemiological studies. It does not demand the co-operation of patients, and it includes all patients regardless of age. This type of study is relatively simple and inexpensive to perform. Although it cannot replace epidemiological field surveys, it can give a reasonably fair estimate of prevalence in a population. Data from studies similar to this may permit insight into local public health and indicate ways to improve care. Formal training and standardisation of data collection are desirable and may be appropriate for audit groups to undertake prior to setting up a multi-practice audit for any chronic disorder. Accuracy can be increased if the information could be transmitted electronically to a district health authority or to a central register which carried out prevalence estimations similar to that set up by the RCGP sentinel practices (Flemming, 1994). If GPs are willing to attain this level of recording then it would be in the interest of audit groups, PCGs and the NHS to direct resources to support them in two ways; firstly by providing training in data recording and collection, and secondly by providing means of collating and transmitting data for aggregation. Further research also needs to be carried out in to the best methods of collating and aggregating audit data. This study and Chapter 2.2 show that there are large differences between the audits regarding audit design and in consequence only just over a quarter of audits could be used to estimate the prevalence. A standardised audit protocol could reduce

the influence of methodological problems and thereby the variation in reported prevalence. With careful and appropriate use, this would provide a new approach that could considerably improve our ability to monitor disease.

Conclusions

The prevalence rates of chronic disorders can be assessed and compared using data from multi-practice audits. The collation of audit data could improve the precision of quantitative estimates of health status in populations and increase understanding of variation between populations.

3.2. Quality of care of diabetes in primary care

3.2.1 Introduction

Chapter One highlighted that the number of practices conducting audit and the number of audit groups conducting multi-practice audits of diabetes care has increased since the introduction of audit in 1991. The purpose of audit is to improve care, and therefore information is needed about the quality of diabetes care in general practice.

Well accepted measures of the quality of diabetes care include: annual assessment of eyes, feet and urinary albumin, measurement of blood pressure, assessment of glucose and lipid levels, and enquiry and advice about smoking habits (Chapter One and Chapter 2.1). These are all aspects of care which can be monitored by audit. Collation of audit data would have many potential uses. It could provide data for assessing health needs, planning and audit (Smith et al, 1995). The data might also provide information about the quality of care, and allow comparison of performance between different audit groups in different localities. Data on quality of care would be useful for clinical governors and PCGs and provide information on best methods of collation of audit data. Diabetes has been chosen for NSF to be developed over the next two years (Chapter One). Data on quality of care would be useful for those developing NSF to establish models and to ensure people with diabetes receive greater consistency in the availability and quality of services. However, the practicality of collection and collation of audit data has not yet been determined.

3.2.2 Aims

1. To determine the feasibility of collecting data from multi-practice audits.

2. To describe the pattern of care of diabetes in primary care.

3.2.3 Method

Chapter 2.2 and 3.1 detailed the recruitment process for this survey. Although the data for organisation of PCAG led audits was limited to audits conducted since 1993, we asked audit groups to supply quality of care data for all multi-practice audits conducted since 1991. A total of 74 audit groups were identified as having been involved in diabetes multi-practice audits where they had collected data on process or outcome of care since 1991. However, only 58 audit groups had fully completed one data collection.

A workshop was held for local audit groups to discuss the practicalities of collating results and to explore issues of confidentiality over the sharing of information with other groups. Subsequently, a set of rules was established to provide groups with assurance about the security of their data. Groups were given unique codes for identification purposes, and it was confirmed that data would be viewed only by members of the project team and not disclosed to any third party without agreement from the group. The feedback report was sent to a single, named individual identified by the respective group. The anonymity of data from practices or groups in any subsequent reporting was guaranteed.

The workshop also provided a forum in which to discuss the proposed content of the instrument to collect data. A data collection form was produced which requested details of treatment, number of patients included in the audit, numbers of patients in the practices and the process and outcome criteria employed. The instrument was reviewed in the light of comments received at the workshop and by a pilot carried out with six groups. It was then

sent to all audit group co-ordinators who had undertaken a multi-practice diabetes audit. Co-ordinators were also asked to provide aggregated audit results by a method of their own choice such as an audit report, computer printout, computer disk, or summary sheet designed by us. Returned data were reviewed by a Research Associate and transferred to a summary sheet which included the audit criteria that were used in the majority of audits. Information transferred to this sheet was independently checked by myself and discrepancies were settled by checking the original data or by telephoning the co-ordinators. Non-responders were sent a reminder letter and were asked to complete and return the questionnaire and summary sheet within a further three weeks and were also telephoned by me. To ensure optimum data quality, responding co-ordinators were asked to verify the information on the summary sheet and to provide any missing data, where possible. Data from the summary sheets were then processed in a spreadsheet (Excel 5) and a standardised report was produced for each audit group.

3.2.4 Results

Twenty-five out of the 58 groups (43.1%) supplied data from the multi-practice audits of diabetes that they had carried out. Twenty-one groups did not respond although they agreed on the telephone to supply the data, five groups refused, three had difficulty accessing data and four did not send results as their audits were of the structure of care. Data could be collated for 17 of the 25 groups, representing information from a total of 495 practices with 38,288 people with diabetes. Data from the remaining eight groups could not be used for various reasons: some were audits of the structure of care, or were conducted on specific age groups. For others, data were supplied as bar-chart percentages, rather than the original figures.

The seventeen audit groups were located throughout England and Wales, and were responsible for both inner city and suburban locations. A mean of 29.1 practices per audit group (range between groups 10-63) had conducted the multi-practice audit. Fifteen (88.2%) groups had conducted the audit since 1992 and seven (41.2%) had conducted the audit in 1995. There was no difference between the number of GPs and the number of practices in audit groups whose data were used and for those that data were not provided or could not be used.

Twelve audit groups, with a total of 310 (62.6%) practices, supplied information about the number of principals per practice (Table 3.5).

TABLE 3.5:   Practice participation in audit of diabetes by size of partnership.*

Practice Size (No. of Principals)	Number of practices (%)
1	48 (15.5%)
2 - 3	91 (29.3%)
4 - 6	141 (45.5%)
≥7	30 (9.7%)

* Size of practices not known for 185 practices

Just over half (50.7%, range 32.5 to 69.0%) of people with diabetes were under GP care, 19.1% (range 7.6 to 39.7%) were under hospital care and 30.2% (range 11.0 to 49.5%) were under shared care. The number of people with diabetes receiving different types of treatment are shown in table 3.6.

TABLE 3.6: Treatment of diabetes

	Number of audit groups supplying data	Number of Patients	% (range between groups)
Insulin	15	9778	27.4 (19.8 to 32.0)
Diet alone	11	5610	23.2 (16.5 to 27.3)
Oral hypoglycaemic drugs	11	11731	48.6 (42.9 to 59.2)

In collating data, it was assumed that even if a procedure had been carried out, if it had not been recorded then the criterion of care was not complied with. Few groups sought information about outcome measures. The most common process measures investigated in the audits and the level of compliance for each are shown in Table 3.7.

3.2.5 Discussion.

Although many studies have investigated the management of people with diabetes in primary care, most have involved less than a thousand patients (Carney and Helliwell, 1995; Neil et al, 1987; Gatling et al, 1988). Very few studies have involved the aggregation of data from large scale projects. For example, Howitt and colleagues (1993) studied the care given to 2574 patients, and Bennett and colleagues studied 3463 patients (Benett et al, 1994). This study is the largest identified, and involved seventeen audit groups from different parts of the country, with the total number of people with diabetes being in excess of 38,000.

TABLE 3.7: Compliance with process measures for people with diabetes

Process measures completed	Number of groups using criterion (%)	Number of patients	% compliance with criterion (range between audit groups)
*Glycated haemoglobin or fructosamine checked in the last 12 months	16 (94.1)	22633	72.5 (25.3 to 89.3)
*Fundi checked in the last 12 months	12 (70.6)	15613	67.5 (57.8 to 86.6)
*Urine checked in the last 12 months	12 (70.6)	16253	65.8 (27.5 to 80.0)
*Blood pressure checked in the last 12 months	11 (64.7)	20912	87.6 (76.9 to 96.5)
*Feet checked in the last 12 months	11 (64.7)	17183	67.7 (40.0 to 90.8)
*Smoking checked in the last 12 months	10 (58.8)	14223	71.4 (21.9 to 86.0)
Patient reviewed in last 12 months	7 (41.2)	11329	85.5 (51.9 to 94.3)
BMI checked	7 (41.2)	7403	52.5 (26.4 to 68.2)
Visual acuity checked in the last 12 months	7 (41.2)	10450	62.7 (51.9 to 74.0)
Weight checked in the last 12 months	5 (29.4)	7622	72.9 (66.1 to 77.4)
Creatinine checked	5 (29.4)	4814	49.0 (40.0 to 67.3)
Lipids checked	4 (23.5)	2544	37.5 (15.7 to 46.6)
Diagnosis of diabetes correct	3 (17.6)	10153	99.6 (99.2 to 100)
People with diabetes on a register	3 (17.6)	9234	98.2 (92.2 to 99.3)
Blood sugar checked in the last 12 months	3 (17.6)	4764	84.3 (80.7 to 89.6)
Assessment of symptoms in the last 12 months	3 (17.6)	7422	80.6(32.6 to 90.0)
Diet reviewed in the last 12 months	3 (17.6)	3402	62.1 (48.0 to 92.2)
*Glycated haemoglobin in normal range[t]	0	0	0

* These are criteria that were regarded as "must do" based on the strengths of evidence and impact on outcome (Chapter 2.1).

[t] These data were not supplied by the audit groups or were not being collected at the time of this survey.

Feasibility of collating audit data

Just over 40% of audit groups were willing or able to provide details of their audits. Over one third agreed on the telephone but did not supply any data. Despite concerted efforts to allay fears over confidentiality of audit groups, this evidently remains a concern for some groups. Collation of audit data from a larger number of audit groups could improve the precision of quantitative estimates. Modern information technology should help to provide anonymised data for local, regional and national research and analysis (Mayfield et al, 1994).

Validity of audit data

As discussed in Chapter 3.1, it was not possible to check the accuracy of practice diabetes registers and to validate the results of the individual practice audits. The practices in this study were self selected and may not by typical of all practices, for example, they may have been particularly interested in diabetes. However, practice size was known for nearly two-third of practices and this information indicated good representation of partnership size (Department of Health, 1994).

Despite these qualifications, the findings about diabetes care in this study reflect those reported in other studies. The previous section showed that collation of multi-practice audit data is a valid method in estimating the prevalence and treatment of diabetes. The prevalence of diabetes of 1.46% compares well with that found in other recent studies identified in Section 3.1. The new health promotion arrangements for general practitioners may have encouraged efforts to improve the accuracy of general practice registers (NHS Management Executive, 1993a). Furthermore, nearly all the audit groups had used a

combination of methods to identify patients for inclusion in their audits. This study shows

that just over half of people with diabetes received care from their GPs, a figure which is

similar to the proportion reported in a recent study (Dunn and Bough, 1996). Over 20%

received shared care, a level comparable with other studies (Carney and Helliwell, 1995;

Benett et al, 1994).

Selection of criteria

A previous survey of diabetes care provided by GPs showed that one of the barriers to

effective care was lack of time (Chesover et al, 1991). One strategy to address this problem

would be for GPs to concentrate on those aspects of care which research confirms are the

most important. Elements of care which evidence confirm are important in the management

of people with diabetes include the monitoring of eyes, feet, blood pressure and urine

protein (Chapter 2.1). Advice about diet and lifestyle is also indicated. The St Vincent

Declaration demands that these elements of care should be systematically organised and

competently performed (Keen and Hall, 1996).

This study showed that there are wide variations in the criteria chosen for audit of diabetes.

One factor that clearly needs to be addressed is the choice of criteria, which at present are

often not linked to research evidence, even though practical methods for developing criteria

are available (Fraser et al, 1997). All criteria were based on process measures. Many

criteria included in the audits were not supported by strong evidence of impact on outcome

(Chapter 2.1). Evidence-based criteria would help ensure uniformity of data definitions, and

facilitate the collation of data for comparison over time and among facilities (Mayfield et al,

1994). This will identify areas of weakness in health care delivery and encourage

improvements in accordance with the St Vincent objectives. The final report of the St

Vincent Joint Task Force for diabetes care in the UK emphasis the need for up to date and continuing education and support for people with diabetes in a local, comprehensive, and organised setting (St Vincent Joint Task Force for Diabetes, 1995). The Task Force also raised the question of developing "population-based diabetes registers" to assist in covering the clinical needs of all patients and to help collect key clinical information (St Vincent Joint Task Force for Diabetes, 1995).

Care of people with diabetes

The challenges described in the St Vincent Declaration include achievement of a reduction in long term, disabling complications of diabetes (St Vincents Joint Task Force, 1995). There is also good evidence that many of these complications may be delayed or prevented (Chapter 2.1; Clark and Lee, 1995). Chapter One highlighted inadequate process and intermediate outcomes of care in single published practices and multi-practice audits of diabetes in primary care between 1976 and 1992. This current study of multi-practice audit conducted since 1991 still highlights these deficiencies in care. Despite the contractual arrangements for health promotion (NHS Management Executive, 1993a), this study has highlighted a number of deficiencies in care, and wide variations in performance between audit groups. The quality of care for people with diabetes in this country clearly needs improving. Although, it may be impossible to achieve uniform and ideal control in every patient with diabetes (Pickup, 1988), many practices need to take steps to attain higher standards of care. Nevertheless, Chapter One also showed that re-audit within these practices can lead to improvements in care.

Information about levels of performance in large numbers of practices may have a role in improving care. For example, information can be used to set standards of care (Benett et

al, 1994) or norms (Marinker, 1990). Targets based on normative data derived from comparable care settings may be more attainable in routine practice (Butler et al, 1995). Collation of data can be used as a method to develop norms by which individual practitioners can compare their own activity.

Peer comparison of audit groups or PCGs may also be a tool for improving standards of care. They can indicate elements of care for which performance is poor in comparison with other PCGs or localities. Local providers can then concentrate their efforts on improving these aspects of care. Differences in care between localities may merit investigation to identify reasons for variations and may therefore act as a stimulus for improvement in care. Locally developed guidelines disseminated through practice based intervention have been shown to improve the management of diabetes as assessed according to these evidence-based criteria (Feder et al, 1995).

Comparison between audit groups or PCGs could also act as a stimulus to quality of audits. Collated data can also be used to highlight aspects of care which are particularly poor throughout the country. These can then be addressed in education programmes, or emphasised in guidelines or targeted by other strategies.

Conclusion

This study has shown the feasibility of collating audit data and the potential of this approach for describing the pattern of care and highlighting general and local deficiencies. Although there are some weaknesses in the quality of the data, the findings are sufficient to highlight particularly poor levels of care in some districts that should be investigated in greater detail.

They also show the potential of data collated from multi-practice audits in different parts of the country.

The wider use of evidence-based criteria would further improve the effectiveness of individual audits and also facilitate the collation of data. This method of audit data collation may be applicable to other conditions in addition to diabetes. The comparison of health needs of local populations with national data could be used to support commissioning of services to meet these needs. The data might assist purchasing and providing bodies to define aspects of care that are less than ideal and indicate options for service development or quality improvement. The study has also demonstrated wide variations in performance. The quality of care for people with diabetes should be improved, particularly some elements of care in some districts. The choice of methods for quality improvement needs to be supported by research into those elements of care that are particularly poor throughout the country. These data on deficiencies in care and the methodology of audits conducted will be useful for PCGs monitoring quality of care of other chronic disorders. These data will also be useful for those responsible for developing and implementing the NSF for diabetes. Collation of practice level data in contrast to audit group level data would allow identification of reasons for variations in care of patients with diabetes. These could then be addressed.

Appendix to Chapter Three

- Letter to audit group Chairs

- Data collection forms

- Verification of data letters

DATE

Dear

INTER-GROUP AUDIT - *a new service for MAAGs*

In a directly comparable way with multi-practice audit at a local level, the Lilly Audit Centre is offering a new service which will enable MAAGs to compare *anonymously* their multi-practice audits of **asthma and diabetes** with other MAAGs throughout England and Wales. I enclose a copy of our information leaflet to give you further details of our new service.

In exchange for information from your MAAG, the Lilly Audit Centre will send the MAAG an individualised report, at no cost, which will provide informative feedback about the performance of your MAAG and practices in relation to other MAAGs nation-wide and which will help the MAAG identify strengths and weaknesses of local clinical care. A number of MAAGs are already participating in this new service.

From an earlier Centre study, or from subsequent contact, we understand that your MAAG has been involved in a multi-practice audit of asthma and/or diabetes. Initially, we are asking your MAAG to:

i.   Provide the Lilly Audit Centre with details of the organisation of your asthma and/or diabetes audit(s) by completing and returning the enclosed form(s) in the pre-paid envelope provided by **FRIDAY 2 FEBRUARY 1996**. The form is designed for easy and relatively quick completion. We ask that you complete one form for each multi-practice audit of asthma and/or diabetes that your MAAG has been involved in. Additional forms can be obtained from the Lilly Audit Centre.

ii.   Provide details of **aggregated practice** audit results. We will be very happy to receive these in a way that is most convenient to your MAAG. This might by sending us a copy of the audit report(s), a computer print-out of the results, or providing the information on disk.

iii.   Complete and return the enclosed yellow contact details form, indicating the recipient for the MAAG's individualised feedback report.

In the near future we are also aiming to collect *anonymised* **individual practice** audit data from your MAAG. We would like to stress here that we are *not* interested in identifying any individual practices and any information disclosed to the Centre which may help to identify a practice would be immediately destroyed. You may wish to discuss within your MAAG as to whether it would be possible to release such information. Your MAAG chair will have received details of this new service. Once again, we will be asking for this information in the way most convenient to your MAAG i.e. by sending us your practices' audit report(s), a computer print-out, disk, or alternatively by completing a form designed by the Lilly Audit Centre.

I will be contacting you by telephone in the next couple of weeks to answer any queries that you may have about this new service and to ascertain whether your MAAG will be willing to provide us with the information that we are seeking and, if so, in what format. In the meantime, should you wish to contact me, I can be reached at the Lilly Audit Centre on 0116 258 4351.

Yours sincerely,

Moira Rumsey
Research Associate

ELI LILLY NATIONAL CLINICAL AUDIT CENTRE

DIABETES - FORM B   MAAG NO: [   ]

INDIVIDUAL PRACTICE RESULTS

PRACTICE NUMBER: _____ (01-99)

	FIRST CYCLE	MOST RECENT CYCLE (if applicable)
Number of GPs in practice		
Total list size of practice		
Total number of diabetics in practice		
Total number of diabetics in practice audit		
Number of males included		
Number of females included		
Type of care included: GP only		
Hospital only		
Shared care		
Type of treatment included: Diet		
Tablets		
Insulin		
AUDIT CRITERIA	*** FIRST CYCLE**	*** MOST RECENT CYCLE (if applicable)**
Glycated HbA1 checked in last year		
Feet checked in last year		
Urine checked in last year		
Fundi checked in last year		
Smoking status checked in last year		
Blood pressure checked in last year		
Visual acuity checked in last year		
BMI (or weight and height) checked in last year		
Correct diagnosis made		

	FIRST CYCLE	MOST RECENT CYCLE (if applicable)
Patient recorded on diabetic register		
Assessment of symptoms in last year eg for hypoglycaemia		
Diet reviewed in last year		
Diabetes education given		
Patient reviewed in last year		
Patient monitors blood/urine		
Urine/blood records checked in last year		
Lipids checked in last year		
Complications present: retinopathy		
nepropathy		
neuropathy		
amputation		
Other (please specify below)		

*Please provide total number of patients in **practice** for who audit criteria have been recorded as carried out. Please also include sample size where different from practice audit sample size eg 45/100.

PLEASE REMEMBER TO GIVE ACTUAL TOTALS RATHER THAN PERCENTAGE TOTALS

Dear

Inter-group Audit Service for asthma and diabetes

Thank you very much for providing us with information on your MAAG's multi-practice audit(s) which we note with great interest. It appears that many worthwhile audits have been undertaken over the last few years and which have led to impacts on the quality of care provided to the local population. Over 20 MAAGs have participated in the Inter-group Audit Service so far, providing us with aggregated MAAG data relating to approximately 19,000 asthmatic patients from over 230 practices and to approximately 30,000 diabetic patients from more than 470 practices. We are delighted that other MAAGs are also in the process of joining the service.

In order for the Lilly Audit Centre to undertake a meaningful collation of the findings of these audits and to provide informative comparative feedback to MAAGs, we have devised a minimum dataset which includes the criteria most commonly used by MAAGs in these audits. This dataset can be found on the enclosed Form(s) 'A'.

We have transferred the aggregated audit findings given to us by your MAAG onto the form(s) where we have been able to do so. We now ask that you verify the information on Form(s) 'A' where given and provide us with any missing data, if possible. As we are interested in actual total figures rather than percentage total figures, we have made estimates of actuals where percentages have been provided. Estimates are denoted in brackets. If this applies to your MAAG, we ask that you check and correct the figures where necessary. Please remember, the service will only be a good as the information provided to us by participating MAAGs. We hope that you will complete and return Form(s) 'A' in the prepaid envelope provided or by faxing the form(s) to us on 0116 258 4982 by **FRIDAY 12 APRIL 1996**.

Following from this, the next stage in the development of the Inter-group Audit Service is to ask MAAGs for the audit findings for each participating practice. If your MAAG is interested in being involved in this stage, please read the details associated with the enclosed Form(s) 'B'.

In the meantime, if I or any other members of the Inter-group Audit Service can be of any further assistance, please do not hesitate to contact us.

Yours sincerely,

Ms Moira Rumsey
Research Associate

Dr Richard Baker, *Director*
Dr Kamlesh Khunti, *Clinical Lecturer*

CHAPTER FOUR:

METHODOLOGY (STAGE II)

4.1. Use of multiple methods to determine factors affecting quality of care of people with diabetes

4.1.1 Introduction

Although the process of care of patients with diabetes is complex, general practitioners are playing a greater role in its management. Despite the research evidence, the level of performance in primary care can be variable (Chapter One and Chapter Three).

In order to improve care, information is needed about the characteristics of practices that offer different levels of care, and the obstacles faced by practices in improving care. Knowledge of factors that influence quality of care in diabetes would inform the development of quality improvement programmes. Large scale questionnaire surveys are frequently carried out in primary care research and a questionnaire survey of practices might help to identify factors associated with good quality of care of patients with diabetes. However, if the findings of a questionnaire survey are to be generalisable, a large representative sample and a high response rate are required. Low response rates are a particular problem in postal surveys of GPs in the UK (Sibbald et al, 1994). The most important factors influencing response rates are perceived relevance, number of approaches, the investigating agency, type of population surveyed and questionnaire length. A great deal of attention has therefore recently been given to the potential value of qualitative methods of research in health care (Fitzpatrick and Boulton, 1997). Qualitative and quantitative methods can be used to develop questionnaires, generate hypothesis and assist the development of survey procedures (O'Brien, 1993). Qualitative methods in diabetes are being used to obtain more personalised feedback on the beliefs, attitudes and behaviours of participants which may be missed through quantitative

methods (Anderson et al, 1996). Qualitative and quantitative methods can be used to form hypotheses about the factors that could influence the quality of care. To date few examples exist in general practice research on how these methods can be used for hypothesis generation. Chapter One discussed diabetes as a multisystem disease and illustrated that a mutidisciplinary group of professionals are involved in the care of people with diabetes. Therefore, to gather information on all potential factors that may be related to good quality of care of people with diabetes, information from as many sources as possible is required. For Stage II of the study, hypotheses had to be formulated about the potential factors that may be associated with good quality of cre.

4.1.2 Aims

To use multiple methods to identify factors potentially associated with the quality of care delivered to people with diabetes.

4.1.3 Method

Recently increased attention has been given to the potential value of qualitative methods of research in health care (O'Brien, 1993). Qualitative method is one approach for generating hypotheses on factors associated with good quality care of patients with diabetes. Factors for consideration in management of diabetes were generated by multiple methods: literature review, followed by brainstorming, then a focus group and then use of the key informant technique with GPs and practice nurses. Data from Chapter 3.2 were presented to participants in the brainstorming session. The methods of brainstorming, focus group and key informant techniques were used only for identifying potential factors that may be related to the quality of diabetes care. As these methods

were used only to generate a list of factors relating to quality of care, the sessions were not transcribed for detailed thematic analysis. All sessions were facilitated by KK and data were recorded on standard recording sheets which were entered into a spreadsheet.

Literature Review

A systematic search focused on quality of care of people with diabetes in primary care was conducted. The search was conducted using Medline, including years 1987-1997 and confined to studies involving humans and published in English. In view of the large number of articles, and the time and resources available, only Medline searches were conducted on medical subject headings and free text using terms: diabetes, quality of care, process and outcome of care. The references were sifted on the basis of article titles only. The retrieved papers were assessed to determine previous research evidence about factors associated with good quality care of diabetes. Quality of care for diabetes was defined as in Chapter One and Chapter 2.1 – with emphasis on improved process or outcome of diabetes care. Cross referencing from articles identified further studies for consideration.

Factors that may influence the quality of care of patients with diabetes were identified from the retrieved articles (Griffin and Kinmouth, 1997b; Pringle et al, 1993; Carney et al, 1995; Day et al, 1987; Mellor et al, 1985, Whitford et al 1995; Hiss, 1996; Jacques and Jones, 1993; Hawthorne and Tomlinson, 1997; Wilson et al, 1986; Blaum et al, 1997; Butler et al, 1997; O'Conner et al, 1996; Feder et al, 1995; Vaughan and Potts, 1996; Lobach and Hammond, 1997; Benbow et al, 1997; Ward et al, 1997; Kamien et al, 1994; Kinmonth et al, 1996). The literature review identified many articles that

reported similar factors relating to good diabetes care. The literature searching, retrieval and assessment of the papers required approximately 16 hours of work.

Brainstorming

Brainstorming is a technique that allows structured data-gathering to enhnce decision making (McMurray, 1994). Brainstorming sessions, if conducted properly are a quick means of focusing attention on possible solutions for problems (McMurray, 1994). Because of the interactions between them, several people in a group setting, by building upon each other's contributions, will be able to generate more ideas about a subject than could the individuals by themselves (McMurray, 1994). Because brainstorming requires verbal interaction among group members, the individuals in the group must have a comfortable level of trust with each other and sufficient time for the session must be allowed. The brainstorming session was conducted in a University Department of General Practice and lasted 30 minutes. There were 15 participants including academic general practitioners and research staff. One member of the research staff had diabetes. Prior to the brainstorming, participants were presented with audit data relating to the care of diabetes in 17 Health Authorities in England and Wales (Chapter 3.2). The audit had shown deficiencies in care and wide variations in the process of care of people with diabetes.

Focus Groups

Focus groups enhance the validity of questionnaires or hypothesis by highlighting those concerns held by users and providers that would otherwise be neglected (Powell et al, 1996). Although brainstorming is a rapid and convenient way of collecting information

from several sources simultaneously, focus groups explicitly use group interaction as part of the method (Kitzinger, 1995). Focus groups can permit formulation of new hypotheses and inform further study (Powell et al, 1996). This method allowed more detailed information to be obtained including themes identified by brainstorming. One focus group was held and included two diabetes consultants, an epidemiologist with an interest in diabetes, a practice nurse with an interest in diabetes and a public health consultant. This session lasted 25 minutes. Specific factors that may contribute to good quality of care were identified.

The Key Informant Technique

The key informant technique is a qualitative research method in which an expert source of information is asked to provide deeper insight into an issue (Marshall, 1996). Key people known to KK and currently delivering care to people with diabetes in primary care were interviewed. The key informants fulfilled characteristics of an "ideal" key informant (Marshall, 1996):

Role in Community: Their role in the community exposed them to the kind of information being sought for this study.

Knowledge: They had access to information about diabetes care.

Willingness: They are willing to communicate their knowledge to KK.

Communicability: They all had ability to communicate information with KK in an understandable manner.

Impartially: Key informants were objective in their information. However, KK was unable to determine whether the informants were biased in their information.

The key informants included two practice nurses who ran diabetes clinics and two general practitioners with experience in providing care to people with diabetes. All key informants were interviewed individually. A major disadvantage of key informant technique is that the informants are unlikely to represent or even understand, the majority views of those individuals in their community (Marshall, 1996). Furthermore key informants may only report information which is potentially acceptable and this may depend on the difference between the status of the informant and the researcher. Some factors identified the by literature review, brainstorming and the focus groups were explored in more detail with key members responsible for delivering diabetes care in general practice. Face to face interviews lasted 20-30 minutes.

Patients

Consulting the public is an important component of commissioning health services and it has been suggested that health care workers who wish to know the values people attach to health services should adopt qualitative approaches (Bowie et al, 1995). There is increasing interest in incorporating lay perspectives, especially people with experience of the disorder of concern, in health services research because of the potential for influencing research priorities and identifying problems (Entwistle et al, 1998). The importance of incorporating the needs and perspectives of people with diabetes into quality assurance has been well recognised (Duchin and Brown, 1990; Anderson et al, 1996). Suggestions about factors relating to quality of care for people with diabetes were obtained by brainstorming at a meeting of the local branch of the British Diabetic Association. Attendees at the BDA meeting included people with both Type 1 and Type 2 diabetes and their carers.

4.1.4 Results

A wide range of potential factors were identified. The five methods identified 54 potential factors that may be related to good diabetes care. Twenty (37.0%) were practice related factors (Table 4.1), 20 (37.0%) were organisational factors (Table 4.2) and 14 (25.9%) were patient related factors (Table 4.3). Brainstorming identified 89.2% (33/37) of the factors identified by the literature review. Table 4.4 shows the proportion of potential factors identified by each of the five methods, and the yield following combining different methods. Only 5.6% (3/54) of factors were identified by all five methods.

There was overlap of factors identified by the various methods. The focus group and the key informants in particular identified specific and detailed enablers and obstacles to quality diabetes care. For example, in the brainstorming session, availability of individual members of the diabetes team were identified as broad themes. However, the key informants found teamwork among these individuals was also essential for high quality care. Although only a few factors were identified by patients and carers, they were generally very critical of the care received in primary care. During the session with patients and carers, it was apparent that they felt easy access to primary care diabetes service and delivery of care by individuals who were interested in diabetes was essential for good quality care.

TABLE 4.1 **Practice factors that may be associated with quality of diabetes care.** (n=20)

	Method of identification				
Partner/s with an interest in diabetes	a	b	c		e
General practice diabetes education	a	b	c		
Vocationally trained doctors	a				
Practice nurse with an interest in diabetes	a	b	c		e
Young partners	a	b	c		
Training practice	a	b	c		
Teaching practice		b	c		
Practice size (number of patients)	a	b			
Number of partners		b	c	d	
Number of practice nurses	a	b	c	d	
Practice manager	a	b			
Appointment system		b			
Personal list		b			
Computerised practice	a	b	c	d	
Attachment of a practice manager		b			
Practice workload	a	b	c	d	
Fundholding			c		
Teamwork in practice			c		
Practice motivation	a	b	c	d	
Type of consultation (e.g. patient centred)	a	b			

a   Literature review
b   Brainstorming
c   Key informant technique
d   Focus group
e   Patients

TABLE 4.2 Organisational factors that may be associated with quality of diabetes care. (n=20)

	Method of identification				
Presence of a diabetes register	a	b	c	d	
Presence of a recall system	a	b	c	d	
Structured care in a diabetes clinic	a	b	c	d	e
Special arrangements to see diabetic patients		b			e
Attachment of a diabetes nurse/health visitor	a	b	c	d	
Access to a chiropodist	a	b	c	d	e
Access to an optician/optometrist	a	b	c		e
Access to a dietician	a	b	c	d	e
Presence of a glucometer	a	b	c		
Approved for chronic disease management	a	b			
Proportion of patients self monitoring	a	b	c		e
Prevalence of diabetes		b		d	
Good local secondary care diabetic services	a	b		d	
GP diabetes education	a	b	c		e
Practice nurse diabetic education		b	c	d	
Involved in diabetes audit/quality assurance programme	a	b			
Presence of diabetes protocol/guideline	a	b	c	d	
Development of practice protocol/guideline		b		d	
Presence of decision support system	a				
Introduction of change as a result of audit	b				

a	Literature review
b	Brainstorming
c	Key informant technique
d	Focus group
e	Patients

TABLE 4.3 Patient factors that may be associated with quality of diabetes care (n=14)

	Method of identification				
Patient education	a	b			
Sex of patient	a				
Psychological factors	a				
Type of treatment	a	b			
Type of diabetes	a	b		d	
Patient self monitoring diabetes care	a	b	c		e
Length of illness	a				
Mobile population		b			
Frequency of attendance	a	b	c		e
Deprived patients	a	b	c	d	
Unemployed patients		b		d	
Elderly patients		b		d	
Patients with chronic illness		b			
Ethnicity			c	d	

a	Literature review
b	Brainstorming
c	Key informant technique
d	Focus group
e	Patients

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TABLE 4.4 Number (%) of potential factors that may affect quality of care of people with diabetes identified by multiple methods.

	Literature Review (a)	Brainstorming (b)	Key informant Technique (c)	Focus Group (d)	Patients (e)	Combination of a+b	Combination of b+c
Practice factors (20)	13(65.0)	17(85.0)	13(65.0)	5(25.0)	2(10.0)	18(90.0)	19(95.0)
Organisational factors (20)	15(75.0)	19(95.0)	12(60.0)	11(55.0)	7(35.0)	20(100.0)	19(95.0)
Patient factors (14)	9(64.3)	10(71.4)	4(28.6)	5(35.7)	2(14.3)	13(92.9)	11(78.6)
Total (54)	37(68.5)	46(85.2)	29(53.7)	21(38.9)	11(20.4)	51(94.4)	49(90.7)

4.1.5 Discussion

The proportion of people with diabetes being reviewed in general practice has increased since 1990 (Goyder et al, 1998), but the level of care is variable (Chapter 3.2). A potential explanation is that the delivery of care to patients with diabetes is complex with many factors influencing the care (Chapter One). Previous research by Pringle and colleagues has shown that only a few factors out of twenty-five potential factors explained 15.4% of variance in random glycated haemoglobin values (Pringle et al, 1993). This present study found a further 29 potential factors of which only 12 have been reported in literature. The complexity of delivery of care to people with diabetes is therefore reflected in the large number of potential factors identified in this study.

The methods in this study were used to identify themes rather than produce a list of specific interventions that may be related to good quality diabetes care. A qualitative approach was employed for generating the hypotheses given the exploratory nature of the study. Qualitative techniques offer an alternative approach especially to identify how people feel about the services they deliver or receive and to explore issues in greater depth.

Implications

A questionnaire study can be designed to identify potential factors related to quality care in diabetes. However, such surveys depend on response rates which have been low in recent surveys (McAvoy et al, 1996). Furthermore, they may be unable to provide the richness and the breath and depth of information that can be obtained by qualitative methods.

Multiple methods can therefore be useful for obtaining a variety of information on the same issue and overcome the deficiencies of single-method studies.

A comprehensive literature review is important. In early stages of planning any research study. Qualitative methods were used to explore additional factors from users and providers of diabetes care. Furthermore, quantitative data, such as audit data, can be used to stimulate hypothesis generation. Literature searching and brainstorming were the most effective methods of identifying the potential factors and together identified nearly 95% of the factors. The combination of literature searching and brainstorming may be an acceptable alternative for hypothesis generation and other researchers may wish to adopt this pragmatic approach if there are limitations of time or resources. No single method identified more than 85.2% of the factors identified by all five methods combined. Although there is increasing interest in incorporating lay perspectives in health services research and in exploration of barriers to effective care (Quill, 1989), in this study the patients or their carers did not identify factors in addition to those identified by other methods.

Findings from such analyses can support the identification of relevant factors. It has been recognised that for health care evaluation, a wide range of research methods are required (Black, 1996). Each evaluation method provides unique data. Although multiple methods are common in nursing (Corner, 1991) and social science research (Halvorsen et al, 1993), there are only a few published general practice studies that have reported similar methods in the United Kingdom. These have been used in rapid appraisal for planning primary care services (Murray et al, 1994; Dale et al, 1996).

This study shows the feasibility of linking qualitative and quantitative methods for hypotheses generation. The study also demonstrates how multiple methods enable a complete picture which may be missed if only one approach was applied. A major strength of using these techniques is the proximity of the researcher to key members responsible for delivering care and users of services provide greater insight into the topic being researched. Qualitative methods therefore allow more personalised insight into those involved in delivery of services. Furthermore, involvement of all key stakeholders including patients, carers, clinicians and policy makers, minimises risk of unrepresentative sampling. The methods used in this study do not provide quantitative representativeness, but do ensure a broad range of ideas because a variety of relevant people were involved. The multiple methods used are complimentary especially the literature review and the brainstorming which guided further in-depth analysis of enablers and barriers in the focus group and key informant sessions. The list of potential factors generated can also be used by other researchers.

Limitations

Several problems are, however, inherent in using multiple methods for hypothesis generation. Major barriers to conducting multiple method studies include time and cost, and the skills of the researcher. The literature search required a substantial amount of time (approximately 16 hours). Brain storming, key informant technique and focus groups required an additional three hours, excluding the time required of the participants and for arranging the meetings and analysis. Furthermore, for research purposes the list of potential factors identified by these methods may be so large that it would be difficult

to test all these factors in one study. In addition, this present study did not attempt to prioritise the identified factors on the basis of perceived importance.

Use of multiple methods also requires careful planning. The researcher may have limited methodological training that may be limited in certain areas. The researcher also needs to be aware of strengths and weaknesses of each method. This method also relies on description and interpretation by the researcher. Furthermore, the research question needs to be clearly focused for participants. In addition, combining and interpretation of data obtained by multiple methods can be difficult.

Conclusions

This study has shown that multiple methods can be a useful in exploratory research in primary care. A broad range of issues relating to the care of people with diabetes in primary care have been identified. The factors emerging from this work duplicate some hypotheses derived from previous research and also suggest new ones for further investigation. This study has developed a way of combining various traditional methods in an attempt to overcome the deficiencies and bias that may occur when using a single method. Similar methods could therefore be used to generate hypotheses for other exploratory research. Furthermore, multiple methods may also be useful for health authorities and PCGs when assessing the health needs of their local populations and commissioning services to meet these needs (Pearson et al, 1996). The next stage of the study will explore the relationship between some of the identified factors and the quality of care of people with diabetes. Further research needs to be conducted on how patients

can be used in identifying factors relating to good quality care (primary and secondary)

and on issues of priority setting.

4.2 Sample size for Stage II

The sample size was calculated on the basis of dichotomous outcomes, process indicator met versus process indicator not met in order to calculate the necessary sample size for these dichotomous outcomes. Three factors had to be considered (Altman, 1994):

i) a 'clinically significant' difference in the proportions of patients in which the process indicator was met between two groups. This is a difference big enough that, if it were actually present, the study should not miss it. For example, it may be that a 5% difference in the proportions of patients who had their feet examined in the past 12 months between fundholding and non-fundholding practices would not be 'clinically important' – ie it would not matter too much if the study failed to detect such a small difference) but that a 10% difference should not be missed. Judging what difference would be clinically significant is a difficult and subjective problem, and therefore a number of power calculations based on different 'clinically important' differences were performed. These were based on :

a)   the critical p-value; following convention p<0.05 (2-sided) was used.

b)   the power of the study.

In any study there is a risk of failure to detect a true difference of a size that is clinically important. The risk one is prepared to accept of this is (1-the power). For example, a power of 80% indicates that, if there is a real difference between the two groups equal to the clinically important difference, there is a 20% chance that the observed difference will not be statistically significant (ie a 20% chance of type II error). The bigger the study the higher the power. Power calculations based on 80%, 90% and 95% power were performed.

In the table, the required sample size given is the **total number of practices**. The example given is compliance in annual assessment of feet (64.5% overall from a local audit group survey).

	Statistical power required		
Clinically important difference in % of patients meeting criterion	95%	90%	80%
10% (ie 61% *vs* 67%)	764	617	464
20% (ie 58% *vs* 70%)	191	154	116
30% (ie 56% *vs* 73%)	95	77	58

The reason for the large number of practices is the high variance between local practices in the proportion of patients who had their feet checked (ranging from 99% to 9.6% from the local audit group data). Under these circumstances the available number of practices would only have sufficient statistical power to detect a fairly substantial difference between (say) fundholding and non-fundholding practices, eg 154 practices would give 90% power to detect a true difference as large as 58% *vs*. 70% of patients checked in the two types of practices, at $p < 0.05$.

For annual compliance with measurement of glycated haemoglobin, the local audit data showed that the variance was much smaller, so fewer practices are needed to detect equivalent differences in this criterion:

	Statistical power required		
Clinically important difference in	95%	90%	80%
% of patients meeting criterion			
10% (ie 76% *vs* 84%)	141	114	86
20% (ie 72.5% *vs* 87.5%)	40	33	25
30% (ie 70% *vs* 91%)	21	17	13

On the basis of previous research involving a small number of practices, (Dunn and Pickering, 1998) and the resources available, a sample size of 160 practices was selected for Stage II of the thesis.

4.3. Identification of audit groups and practices

The factors about which information was sought from the audit group, the health authority and the practice questionnaire survey are listed in Box 4.1. Data required for this study related to factors that may potentially be associated with quality of care delivered to people with diabetes. These were identified using multiple methods as described in Chapter 4.1. However, 54 factors were identified and it would be impossible and impractical to obtain information for all those factors. Therefore a pragmatic decision was taken. Information would be obtained if:

- Three or more sources of methods identified the same factor in Chapter 4.1.

- Data were easily obtainable by a questionnaire survey or from routine health authority or audit group data.

Data on practice list size, fundholding status of practice, and approval for chronic management was sought despite these three being identified by only two methods. This decision was based on the fact that these are important confounding variable and data on these factors are easily available from routine health authority data. Data on personal list system was sought because there is little information of the impact of continuity of care on delivery of quality of care in general practice. The information on personal list system could also be collected by a questionnaire survey. We were unable to obtain data on practice motivation, proportion of patients self monitoring diabetes and frequency of attendance from the routine data available.

Data for two deprivation measures were collected because the Jarman Score (Jarman, 1984) is currently used for deprivation payments and the Townsend Score (Townsend et

al, 1988) which is closely related to material deprivation. For two health authorities, the Jarman Score was calculated at electoral district (ED) level and for one it was calculated at ward level. Ethical approval was granted from all three local research ethics committees, and respondents. The Health Authorities were assured of the confidentiality.

Data collection and validation

Data were analysed using SPSS for Windows version 8 statistics package. All questionnaires were entered twice by a Research Assistant and 20% of data entry was validated by KK.

A number of factors that might possibly be associated with good quality care of people with diabetes (Box 4.1) were identified by a combination of methods are shown in Box 4.1. Data about the presence or absence of these factors were obtained by a questionnaire survey of all practices in the three health authorities and from routine general practice data from the three health authorities.

Audit groups and audit data

A list of audit groups that had conducted a multi-practice audit of diabetes was available (Chapter 3.2). The inclusion criteria for this study were audits conducted by audit groups that had conducted a systematic multi-practice audit of diabetes, i.e.:

- used a national evidence-based protocol with prioritised evidence-based criteria (Baker et al, 1993).

- given clear instructions on using multiple methods to develop a register of people with diabetes.

- given clear instructions on data collection and analysed the data for the practices.

- given individualised feedback of the results and conducted a second data collection.

Three audit groups from different areas of England (Leicestershire, Durham and Suffolk) met the inclusion criteria and were selected to take part. Two audit groups had selected every patient with diabetes in the practice and one audit group had used systematic sampling (Derry, 1993) for a small number of its practices. The three audit groups also represented the sample size required for the study.

All data for practices that had conducted at least one data collection were obtained from the three audit groups. Data were obtained at individual practice level (either on paper or computer disk). Details regarding the confidentiality, coding, and the content of data collection have been described in Chapter Two and Three.

4. 4. Questionnaire Survey

A questionnaire was developed and piloted in eight practices, following which a small number of minor alterations were made to the wording of the questionnaire. The self administered questionnaire consisted of 20 questions, the majority of which were closed. The questionnaire was sent in 1997 to all practices in the three health authorities. It was addressed to the practice nurse or the practice manager with instructions that the data needed to answer some questions should be obtained from the practice GPs. Non-responders were sent a reminder after three weeks, and those still not responding were telephoned. A copy of the questionnaire is included in Appendix to Chapter Four.

Box 4.1. Data sought from audit group, the health authority and the practice questionnaire

Partners with an interest in diabetes
GP attended an educational course on diabetes
Practice nurse with an interest in diabetes
Practice nurse attended an educational course on diabetes
Age of partners
Training status of practice
List size[a]
Number of partners
Number of practice nurses
Personal list system[a]
Fundholding[a]
Presence of diabetes register
Presence of recall system
Presence of a diabetes clinic
Attachment of diabetes nurse/health visitor
Access to a chiropodist
Access to an optician or optometrist
Access to dietician
Presence of a glucometer
Approved for chronic disease management programme[a]
Prevalence of diabetes
Presence of diabetes protocol/guideline
Type of diabetes
Deprivation
Elderly patients[b]
Ethnicity[b]

[a]Identified by less than three methods in Chapter 4.1

[b]Components of the Jarman Score

4.5 Routine Health Authority data

The three health authorities provided data about practice characteristics relating to 1996 for all general practices including list size, number of partners, fundholding status, Jarman Score, Townsend Score, training status, and the number of whole time equivalent (wte) nurses.

4.6 Statistical Analysis

Analyses of data were carried out after determining whether data were normally distributed. Histograms were produced on SPSS for Windows (version 8) to determine normality of data. In analysing continuous data I used parametric methods for data that were normally distributed and non-parametric methods for data that were not normally distributed (Altman, 1994).

Appendix to Chapter Four

- Letter to LMC

- Letter accompanying the questionnaire to practice

- Letter to Consultant in Public Health Medicine of the Health Authority

- Letter to Chairman of primary care audit group

- Questionnaire

Letter to LMC

Dear

Diabetes care in General Practice: Factors influencing the Provision of Good Quality Care.

The Eli Lilly National Clinical Audit Centre is conducting a study on the factors influencing the provision of good quality care for patients with diabetes in general practice. The Centre has already published an audit protocol on the features of good quality diabetic care. There are however, vast variations in the management of diabetic patients between practices. The present study is funded by the Royal College of General Practitioners and has received ethical approval from the local ethics committee. This study is being undertaken in three regions and data on diabetic care and routinely held health authority data will be used to determine the variations in management of diabetes between practices. A questionnaire is being developed to send to all general practices in Leicestershire to investigate additional practice factors that influence the provision of good quality diabetic care. Non-responders would be contacted for a telephone survey. Confidentiality of data will be strictly maintained at all times. All data entry will be carried out by a Research Associate and practices will therefore not be identifiable.

Please do not hesitate to contact me if there is any further information that you require.

Yours sincerely

Dr Kamlesh Khunti
Lecturer in Clinical Audit
Eli Lilly National Clinical Audit Centre

3 October, 1997

Dear Sir/ Madam

Factors influencing the provision of good quality care for diabetics in general practice.

We are writing to ask your help with the enclosed questionnaire, which is to be sent to all General Practices in Suffolk. The aim of the study is to learn how Suffolk GPs currently diagnose and treat diabetics. We intend to use the results to improve the way General Practitioners manage patients with diabetes. We hope you will find the questionnaire easy to read. It should take no longer than 5 minutes or so to complete. You may need to ask a General Practitioner with an interest in diabetes to answer some of the questions, such as, numbers 5, and 17-20.

Your reply will be handled in strict confidence. The questionnaire will be shredded after use and no individuals will be identified or be identifiable in any reports or publications. The replies will be analysed at the Department of General Practice and we would be grateful if you could return your completed questionnaire in the prepaid envelope provided.

This study is funded by the Royal College of General Practitioners. The Local Medical Committee has been informed about the study and the questionnaire has had ethical approval.

May we thank you in advance for the time taken to complete this questionnaire. Copies of the study report will be made available to those who are interested.

Yours faithfully

Dr Kamlesh Khunti
General Practitioner and
Clinical Lecturer

Dr Sumita Ganguli
Research Associate

Dr   November 26, 2000
Director of Health Care & Public Health
Suffolk Health Authority
PO Box 55
Foxhall Road
IPSWICH

Dear Dr

Further to my letter of 4th February 1997, I am pleased to confirm that we have now received funding for the study to look at the factors influencing the provision of good quality diabetic care in general practice. Furthermore we have received ethical approval from the East Suffolk Local Ethics Committee. As I mentioned in my previous letter, this study would look at the practice and the patient variables that may be related to the wide variation in performance measures between the general practices. We plan to use the data held by the medical audit advisory group and local health authority to correlate practice and patient variables with the process measures for diabetic care.

I would now like to visit either yourself of a member of the Suffolk Health Authority who would act as a contact person for the study. I would also like to visit Dr XXX at the Primary Care Audit Group on the same day.

The reasons for this visit are three fold - Firstly to discuss the issues around the confidentiality of the data with all the parties involved, and secondly to discuss the data on practice and patient variables that I would like to collect. Finally I would like do discuss how I can keep your work to a minimum as the data collection will be undertaken by a research assistant.

I shall phone your secretary within the next two weeks to confirm some possible dates for me to visit and discuss the study. In the mean time please contact us if you have any queries.

With very best wishes

Yours sincerely

Dr Kamlesh Khunti
Lecturer in Clinical Audit
Eli Lilly National Clinical Audit Centre

Chairman
MAAG   8 July, 1997

Dear Dr

I would like to thank you for your time and consideration to me yesterday and for all your help in allowing us access to your audit data regarding the provision of good quality diabetic care in general practice.

As we discussed, I am enclosing a provisional draft of the questionnaire that I would like to send to all general practices in Suffolk to investigate additional practice factors that influence the provision of good quality care. The study was approved by the East Suffolk Ethics Committee on 28th April 1997 (copy enclosed).

Please contact me if you have any queries.

With very best wishes

Yours sincerely

Dr Kamlesh Khunti
Lecturer in Clinical Audit
Eli Lilly National Clinical Audit Centre

DIABETES STUDY QUESTIONNAIRE   [   ]

We would like to know how you manage diabetes and would thus be grateful if you would spend a few minutes filling in this short questionnaire.

We would like to stress that the results of the questionnaire will be confidential. The coding number will also be removed on receipt so that data entry and analysis is anonymous.

Please place a tick in the appropriate boxes.

1. Does your practice have a diabetic register?   ☐ YES   ☐ NO

2. Do you manage diabetic patients in special sessions dedicated to their care, for example nurse-run clinics?

     ☐ YES   ☐ NO

   If *yes* when did you start this clinic

   <1 year ☐   1 - 2 years ☐   >3 years ago ☐

   If *no* do you run diabetic checks during routine surgery?   ☐ YES   ☐ NO

3. Do you keep a call/recall system for patients with diabetes?   ☐ YES   ☐ NO

4. Are there one or more partners in the practice who have an interest in diabetes, for example, are they in charge of a diabetic clinic?   ☐ YES   ☐ NO

5. Have one or more partners in the practice attended an educational course on diabetes?   ☐ YES   ☐ NO

   If yes please specify what courses have been attended (*write in space*)

   ....

   ....

   When did the partner(s) last attend this educational course on diabetes?

   < 1 year ☐   1 - 2 years ☐   > 3 years ☐

6. Are there one or more nurses in the practice with a particular interest in diabetes?   ☐ YES   ☐ NO

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7. Is there a nurse in the practice who has attended a
   special course on diabetes?   ☐ YES   ☐ NO

   If yes please specify what courses have been attended (*write in space*)

   ....

   When did this nurse last attend this course on diabetes?

   < 1 year ☐   1 - 2 years ☐   > 3 years ☐

8. Do you have a glucometer in the practice?   ☐ YES   ☐ NO

9. Is there a local consultant with a special interest in diabetes
   who you refer patients to?   ☐ YES   ☐ NO

10. Do any of these professionals see patients at your surgery or do you have access for
    referral to:

	IN YOUR SURGERY		REFER TO	
a chiropodist	☐ YES	☐ NO	☐ YES	☐ NO
an ophthalmologist	☐ YES	☐ NO	☐ YES	☐ NO
an optometrist	☐ YES	☐ NO	☐ YES	☐ NO
an optician	☐ YES	☐ NO	☐ YES	☐ NO
a dietician	☐ YES	☐ NO	☐ YES	☐ NO
a diabetic health visitor	☐ YES	☐ NO	☐ YES	☐ NO

11. Do you follow a practice protocol/guideline for
    managing patients with diabetes?   ☐ YES   ☐ NO

    If *yes* what type of protocol/guideline do you use:

    (Please tick one or more boxes)

                    National guideline/protocol   ☐

                    Eli Lilly Centre audit protocol   ☐

                    MAAG/PCAG guideline/protocol   ☐

                    Local guideline/protocol   ☐

                    Practice developed guideline/protocol   ☐

                    Pharmaceutical company protocol   ☐

12. How did you decide which protocol to use?

                    Consultation with the practice GPs   ☐

                    Consultation with patients   ☐

                    Consultation with local GPs   ☐

                    Consultation with local diabetes specialist ☐

                    Other *(please specify)*

....

13. When was guideline/protocol implemented in your practice:

    < 1 year ☐   1 - 2 years ☐   > 3 years ☐

14. Do your general practitioners run a personal list?   ☐ YES   ☐ NO

15. Do you run an appointment system in:

	Morning Surgery	☐ YES	☐ NO
	Afternoon Surgery	☐ YES	☐ NO

16. Describe any special arrangements that you provide

....

17. Have you conducted an audit of patients with
diabetes in your practice? ☐ YES ☐ NO

18. If yes: was there a discussion of the results in
a practice meeting? ☐ YES ☐ NO

Did practice management of diabetes change in
view of these results? ☐ YES ☐ NO

19. Please specify changes made (*write in space)*

....

....

....

....

20. Were there difficulties in agreeing or implementing
changes after the audit? ☐ YES ☐ NO

If so, please specify the difficulties encountered

....

....

....

....

CHAPTER FIVE:

QUESTIONNAIRE SURVEY

5.1 Differences between general practices that do and do not respond to questionnaire surveys

5.1.1 Introduction

The use of postal questionnaires is common in general practice surveys. Recently, however, there has been concern about the poor response rates (Sibbald et al, 1994; McAvoy and Kaner et al, 1998). Detailed information about non-respondents is not readily available and non-response analysis is often limited to doctor characteristics or the practice list size (Cartwright, 1978; Templeton et al, 1997; Sibbald et al, 1994). Chapter Four identified the data that were required for this thesis. Data that were not obtained from the health authority were obtained by a questionnaire survey. Few studies have examined the characteristics of non-responding general practices (Sibbald et al, 1994; Foy et al, 1998), in particular the characteristics of practices that respond after a reminder mailing. The opportunity to investigate this methodological issue arose as part of this thesis because detailed information from routine health authority data (Chapter Four) were available about responders and non-responders.

5.1.2 Aim

To examine the differences in characteristics of general practices that respond after a first mailing, a reminder mailing and those that respond after two mailings of a questionnaire.

5.1.3 Method

In 1997, a piloted postal questionnaire survey of all practices in three health authorities in England (Leicestershire, Durham and Suffolk) was carried out to determine how

services for patients with diabetes were organised within practices (Chapter Four). The questionnaire was addressed to the practice nurse or the practice manager with a covering letter. The questionnaire consisted of 20 questions, the majority of which were closed. It sought details about the organisation of services to people with diabetes, availability of members of practice diabetes team, GPs and practice nurse's self declared interest in diabetes and educational courses attended. Non-responders were sent a reminder letter after three weeks. The three health authorities provided routine data (Chapter Four) relating to 1996 for all the general practices and 1991 census data including Townsend Score, Jarman UP8 Score and components of Jarman UP8 Score. The data were analysed using the SPSS for Windows (version 8). Associations between variables were sought using chi-squared test for categorical variables and Kruskal-Wallis Test for continuous variables. The Kruskal-Wallis test, an extension of the Mann-Whitney U test, is the non-parametric analog of the one-way analysis of variance and detects differences in distribution location (Altman, 1994).

5.1.4 Results

The three heath authorities were responsible for 327 practices (numbers of practices in each health authority: 87, 88, 152). The response rate after the first mailing was 44.3% (145/327). There was no statistically significant difference in the response rate between the three health authorities (42.1%, 44.8% and 47.7%; χ^2 0.73, df 2, p=0.7). The overall response rate after the second mailing was 69.1% (226/327) [69.0%, 70.5% and 69.1%; χ^2 0.11, df 2, p=0.9). Table 1 shows the characteristics of practices that responded to a first mailing, those that responded after a second mailing and those that did not respond. No significant associations were found between the three groups.

Table 5.1 Characteristics of practices that responded after the first and reminder mailing of the questionnaire and those that did not respond. (n=327)

	Respondents (n=226)		Non-Respondents (n=101)	p value
	After First Mailing (n=145)	*After Second Mailing (n=81)*		
Mean number of GPs [SD]	3.7 [2.0]	3.3 [2.4]	3.3 [2.3]	0.13
Single handed [%]	27/142 [19.0]	18/78 [23.0]	24/100 [24.0]	0.61
Mean age [SD]	44.1 [6.8]	44.0 [6.0]	44.8 [7.3]	0.80
Mean Wte[a] nurse [SD]	1.7 [2.1]	1.8 [1.4]	1.7 [1.7]	0.41
Mean Townsend Score [SD]	0.7 [2.9]	0.5 [3.1]	0.9 [3.3]	0.79
Mean Jarman Score [SD]	3.5 [13.7]	2.2 [13.6]	5.6 [14.8]	0.27
Mean (%) patients unemployed[†] [SD]	7.5 [4.9]	7.7 [5.3]	8.1 [5.4]	0.88
Mean (%) patients over 65 years [SD]	16.2 [3.8]	15.0 [3.6]	15.9 [4.1]	0.10
Mean (%) ethnic[†] [SD]	6.5 [10.0]	4.4 [10.2]	8.0 [14.8]	0.23
Mean List Size (1000s) [SD]	6.7 [4.0]	7.0 [4.6]	6.2 [4.5]	0.37
Training Practice [%]	37/143 [25.9]	21/79 [26.6]	21/100 [21.0]	0.61
Practice computerised [%]	128/143 [89.5]	74/79 [93.7]	92/100 [92.0]	0.55
Fundholding [%]	49/145 [33.8]	29/81 [35.8]	32/101 [31.7]	0.84
Practice Manager employed [%]	110/143 [76.9]	62/80 [77.5]	78/100 [78.0]	0.98
GP interest in diabetes [%]	95/142 [66.9]	55/78 [70.5]	25/38 [65.8]*	0.83
Practice Nurse interest in diabetes [%]	126/144 [87.5]	66/81 [81.5]	34/39 [87.2]*	0.45

[a] wte = whole time equivalent

[†] Variable included in Jarman Score

*Data obtained by a telephone survey (see Chapter 5.2)

5.1.5 Discussion

There is often concern about the lack of details about responders and non-responders in primary care questionnaire surveys and investigation of the reasons for the observed decrease in GP participation in research has been suggested (Baker, 1993; McDonald, 1993). Most studies give very little information about the characteristics of non-responders, but, this study allowed a detailed examination of the routine data about responding and non-responding practices after a first and a reminder mailing.

Several factors are known to influence general practitioners' participation in research (Templeton et al, 1997; Foy et al, 1998). Personal interest in the research topic has been shown to have an influence in participation in research (Ward, 1994), but the present study shows that response to the first and reminder questionnaire mailings was not influenced by either the general practitioner's or practice nurse's reported interest in the subject. Although one explanation for low response rates has been the increase in GP workload (Kaner et al, 1998), our study did not show a difference in participation between those practices in socioeconomically deprived areas and those in affluent areas. Cartwright (1978), reported that non-responders tended to be single-handed, but, our survey shows that there were no significant differences in questionnaire response from these practices.

Previous studies have identified few differences between responding and non-responding general practitioners (Templeton et al, 1997; Cockburn, 1988; McDonald, 1993), suggesting that low response rates may not necessarily introduce bias. Our study shows that there were no differences between practices that responded after the first mailing, a reminder mailing and those that did not respond. Although a high response rate should

be encouraged, results of questionnaire surveys with low response may not be affected by

non-response bias.

5.2 Factors associated with implementation of clinical governance programmes for diabetes in primary care

5.2.1 Introduction

Implementation of guidelines by facilitation (Feder et al, 1995) and participation in multi-practice audit have been shown to improve the care of people with diabetes (Chapter One). Implementation of guidelines and participation in audit are also going to be two key elements of clinical governance (Chapter One). Audit and evidence-based guidelines will be principal components of clinical governance, having a role in both implementation and monitoring effectiveness. However, despite evidence about the effectiveness of treatment in preventing mortality and other complications, care of people with diabetes is variable and sometimes poor (Chapter 3.2). Therefore, reducing inequalities by implementing clinical governance programmes is a priority for the National Health Service (Secretary of State for Health, 1998).

GPs are generally positive about the effectiveness and benefits of guidelines and already produce guidelines in their own practices (Siriwardena, 1995). There has also been an increase in the number of practices taking part in multi-practice audits of diabetes and primary care audit groups have been instrumental in encouraging practice participation in audit, with diabetes being the most common topic for a multi-practice audit (Chapter One). Despite these developments, many practices still do not have guidelines and do not participate in audit. Chapter 2.2 showed that around a third of practices invited to participate in a multi-practice audit of diabetes went on to complete the audit. This may account for some of the variations in care offered to patients with diabetes. General

practitioners' attitudes and behaviour relating to guidelines (Siriwardena, 1995), and

practice barriers to audit have been described previously (Webb et al, 1991; Chamber et

al, 1996). However, these surveys were not concerned specifically with diabetes.

There may be many complex reasons why practices do not use guidelines or participate

in audit. A better understanding of practice characteristics and organisational issues that

influence use of diabetes guidelines and participation in diabetes audit would help to

indicate where resources and effort should be targeted in order to encourage practices to

undertake systematic clinical governance programmes for diabetes. This information

would also inform those developing the NSF for diabetes.

5.2.2 Aim

1. To determine the current level of use of guidelines and participation in audit of

   diabetes in primary care.

2. To identify practice factors associated with implementation of these two elements of

   clinical governance programmes in general practice.

5.2.3 Method

The method is described in detail in Chapter Four and Chapter 5.1. Data relating to

practices that had conducted a multi-practice audit were obtained from the respective

primary care audit groups. The three health authorities provided data about practice

characteristics relating to 1996 for all general practices including list size, number of

partners, fundholding status, Jarman Score, Townsend Score, training status, and the

number of whole time equivalent (wte) nurses. Data about clinical guidelines and audit were obtained by the questionnaire survey. Non responders after two mailings of a questionnaire survey were telephoned.

Associations between variables were sought using chi-square tests and unpaired t-tests for comparison of means. Odds ratios were calculated for univariate variables. Multiple logistic regression was employed to determine which factors were independently associated, in a multi-variate analysis, with either having a practice diabetes guideline/protocol, taking part in audit or both as independent variables. Variables were included if there was a significant association in univariate analysis at a significance level of 0.05 or if they were likely cofounders. Explanatory variables were tested in a forward stepwise regression analysis.

5.2.4 Results

The three health authorities were responsible for 327 practices with a total of over 1,150 GPs. The mean number of general practitioners per practice was 3.6 (range between health authorities 3.4 to 4.1), proportion of patients over 65 years was 15.8% (range 14.2 to 18.0), Townsend Score was 0.7 (range 0.54 to 0.85) and the Jarman Score was 3.8 (range -0.1 to 5.3).

Questionnaire response

Two hundred and sixty-four practices responded after two mailings and a telephone survey (mean response rate 80.7%; range between health authorities 70.1% to 90.8%).

Two practices refused to participate and 61 failed to reply. Table 5.2 shows the comparison between responders and non-responders.

TABLE 5.2 Comparison of practices that responded to those that did not respond to the questionnaire survey

	Responders (n=264)	Non-responders (n=63)
No (%) Fundholding	93/264 (35.2)	17/63 (26.6)
No (%) Training	66/260 (25.4)	13/62 (21.0)
No (%) Computerised	237/260 (91.2)	57/62 (91.3)
Mean number of GPs [SD]	3.7 [2.3]	3.1 [1.7]
Mean list size [SD]	6819 [4432]	5803 [3568]
Mean age in years [SD]	44.3 [6.7]	44.5 [7.1]
Wte nurse [SD]	1.86 [2.0]	1.2 [0.9]
Mean Jarman Score [SD]	3.7 [14.2]	4.4 [13.6]
Mean Townsend Score [SD]	0.7 [3.1]	0.8 [2.9]

The responding practices were significantly larger than non responding practices (mean number of GPs 3.7 vs 3.1; p = 0.013). There was no significant difference in mean list size, fund holding status, average age of GPs, computerisation, whole time equivalent (wte) practice nurses, training status, Jarman Score or Townsend Score between responders and non-responders.

Practice guidelines or protocols

Of the responders, 243 (92%; range between health authorities 88.3%-96.9%) practices

had a practice guideline or a protocol for the management of people with diabetes. Of the

practices with a guideline or a protocol, 6.3% (15/238) had introduced the guideline

within the last year, 19.7% (47/238) within one to three years and 73.9% (176/238)

more than three years ago. Table 5.3 shows the sources of guidelines or protocols. All

66 responding training practices had a guideline.

TABLE 5.3 Source of diabetes guideline or protocol used in practice[a] (n=239)

Figures are numbers (%).

Practice developed	168 (70.7)
Locally developed	60 (25.1)
Nationally developed	48 (20.1)
Primary care audit group developed	40 (16.7)
Pharmaceutical company	1 (0.4)

[a] Some practices had multiple guidelines/protocols

Table 5.4 shows the individuals involved in development for practices that developed

their own practice guideline/protocol.

TABLE 5.4 Method used for practice developed guideline (n=168). Figures are

numbers (%).

Consultation with practice doctors	148 (88.1)
Consultation with local diabetes specialists	49 (29.2)
Consultation with practice nurses	14 (8.3)
Consultation with other local GPs	8 (4.8)
Consultation with patients	6 (3.6)
Consultation with the health authority	2 (1.2)

Table 5.5 shows the univariate analysis of factors associated with practices having a

guideline or a protocol. Multiple logistic regression showed that presence of a practice

guideline or protocol was independently associated only with list size (per 1000) [OR

1.2; 95% CI 1.0 to 1.4;p<0.02].

Participation in multi-practice audit

One hundred and sixty nine (51.7%; range between health authorities 44.1%-64.4%)

practices had taken part in a primary care audit group led multi-practice audit of diabetes.

These data were validated with data from PCAG. Table 5.6 shows the univariate

analysis of factors associated with participation in a multi-practice audit. Multiple logistic

regression showed that participation in multi-practice audit was independently associated

only with the Townsend Score [OR 0.9; CI 0.8 to 1.0;p<0.05].

TABLE 5.5 Univariate analysis of factors associated with having a diabetes practice guideline (n=264)

	Yes (243)	No (21)	OR(95% CI)
Mean list size in 1000s [SD]	7.1 [4.5]	4.6 [3.3]	1.2 (1.0 to1.4)[*a]
Mean number of partners [SD]	3.8 [2.3]	3.0 [1.9]	1.2 (1.0 to 1.5)[†]
Mean whole time equivalent nurse [SD]	1.9 [2.0]	1.8 [2.2]	1.0 (0.8 to 1.3)[†]
Mean Jarman Score [SD]	3.2 [3.5]	9.1 [20.2]	1.0 (0.9 to 1.0)[†]
Mean Townsend Index [SD]	0.6 [2.9]	1.9 [4.4]	0.9 (0.8 to 1.0)[†]
Fundholding practice	89 (36.6)	4 (19.0)	2.5 (0.8 to 7.5)
Partner with an interest in diabetes (%)	167/238 (70.2)	8/20 (40.0)	3.5 (1.4 to 9.0)[b]
Partner attended diabetes course (%)	153/210 (72.9)	9/18 (50.0)	2.4 (0.9 to 6.4)
Nurse with an interest in diabetes (%)	211 (86.8)	15 (71.4)	2.6 (1.0 to 7.3)
Nurse attended diabetes course (%)	210 (86.4)	15 (71.4)	2.7 (1.0 to 7.5)

[*] Odds ratio for an additional 1000 patients.   [†] Odds ratio for unit increase

[a]$p<0.05$ [b]$p<0.01$

TABLE 5.6 Univariate analysis of factors associated with taking part in multi-practice diabetes audit (n=327)

	Yes (169)	No (158)	OR (95% CI)
Mean list size in 1000s [SD]	7.0 [4.6]	6.3 [3.9]	1.0 (1.0 to 1.1)[*]
Mean number of partners [SD]	3.8 [2.3]	3.4 [2.1]	1.1(1.0 to 1.2)[†]
Mean whole time equivalent nurse [SD]	1.8 [2.2]	1.7 [1.3]	1.0 (0.9 to 1.2)[†]
Mean Jarman Score [SD]	2.4 [13.3]	5.4 [14.7]	1.0 (1.0 to 1.0)[†]
Mean Townsend Index [SD]	0.4 [2.9]	1.1 [3.2]	0.9 (0.9 to 1.0)[a†]
Fundholding Status (%)	59 (34.9)	51 (32.3)	1.1 (0.7 to 1.5)
Training practice (%)	44 (26.0)	35 (22.2)	1.2 (0.7 to 2.0)
Practice with a diabetes register present (%)	141/142 (99.3)	110/122 (90.2)	15.4 (2.0 to 120.8)[b]
Partner with an interest in diabetes (%)	106/141 (75.2)	69/117 (59.0)	2.1 (1.2 to 3.6)
Partner attended diabetes course (%)	97/128 (75.8)	65/106 (61.3)	2.0 (1.1 to 3.5)[a]
Nurse with an interest in diabetes (%)	123/142 (86.6)	103/122 (84.4)	1.2 (0.6 to 2.4)
Nurse attended diabetes course (%)	121/141 (85.8)	104/121 (86.0)	1.0 (0.5 to 2.0)

[*] Odds ratio for an additional 1000 patients.   [†] Odds ratio for unit increase
[a] p<0.05   [b] p<0.01

Use of guidelines/protocols and participation in multi-practice audit

One hundred and thirty-six (51.5%) practices had both a diabetes guideline/protocol and had participated in a multi-practice audit of diabetes. Fifteen (4.6%) practices neither possessed a diabetes guideline/protocol nor participated in a multi-practice audit. Multiple regression showed that both participation in audit and having a guideline protocol in practice were independently associated with having a partner with an interest in diabetes [OR 1.9; 1.1 to 3.3;p<0.02] and the Townsend Score [OR 0.9; 0.8 to 1.0; p<0.02].

5.2.5 Discussion

Delivery of care to people with diabetes is complex and many GPs encounter problems in caring for people with diabetes (Chesover et al, 1991). An integrated diabetes annual review is suitable for the long-term care of large numbers of people with diabetes, and guidelines for conducting this annual review (RCGP, 1993; BDA, 1997) and evidence-based audit protocols (Baker et al, 1993; Khunti et al, 1998) for assessing the level of compliance with the guidelines are available. Clinical governance is a recent concept for improving quality of care of patients in primary care. This to our knowledge, is the largest study to investigate clinical governance programmes for diabetes in three geographically different health authorities. This survey shows that most practices have a practice guideline or protocol for management of people with diabetes and just over half have taken part in multi-practice audits. There are clear differences between those practices that participate in clinical governance programmes or activities and those that do not.

Limitations of the study

Chapter 5.1 showed that the response rate after two mailings was 69.1% (226/327). However, this increased to 80.7% (264/327) after an additional telephone survey. The response rate of over 80% is excellent for a general practice questionnaire survey. However there are some limitations to the study. The practices that responded were generally representative except for the number of partners. Practices with three or more partners had a significantly higher response rate than those with one or two partners (84.4% vs 74.4%; χ^2 4.8, p<0.05). Larger practices tend to be more developed in terms of practice organisations and staffing (Baker, 1992), and therefore the results may overestimate the use of guidelines and audit. Furthermore, some of the responses to the questionnaire were self reported, for example interest in diabetes. A further reservation is that the primary care audit groups which are responsible for these three regions may be atypical because they have close working links with the local health authorities and GPs. These practices were therefore already involved in clinical governance. The data supplied by the health authorities related to 1996 while the questionnaire was distributed in 1997, but the differences are unlikely to be large. One further reservation is that the terms guideline and protocol and when guideline/protocol was implemented were not defined in the questionnaire.

Development and use of guidelines or protocols

Recent studies have confirmed that clinical guidelines, if appropriately implemented, can bring about improvements in both process and outcome of care including diabetes care (Feder et al, 1995; Grimshaw and Russell, 1993). In agreement with a previous study in Lincolnshire (Siriwardena, 1995), nearly three-quarters of GPs had been involved in

developing their own ("in-house") practice guidelines for diabetes. However, guidelines are more likely to be valid if developed by a multi-disciplinary group with representatives of all key disciplines (Chapter One). Practice nurses play a key role in systematic care of people with diabetes, but, our survey shows that very few guidelines were developed in consultation with practice nurses. Even though the development of valid guidelines requires high levels of expertise and resources (Grimshaw and Russell, 1993; Grimshaw et al, 1995a; Grimshaw et al, 1995b), many practices were developing their own practice guidelines or protocols. Practices are unlikely to have the expertise or resources required, and should be encouraged to use well developed local or national guidelines, or be offered training to adapt nationally developed guidelines or protocols (Baker and Fraser, 1997). Furthermore, most guidelines (73.9%) were implemented more than three years previously. Guidelines must be updated regularly or in the light of significant new evidence. The use of guidelines does not automatically bring about improvements in care since their effectiveness depends on the strategies chosen to implement them (Grimshaw et al, 1995b). We did not evaluate the recommendations of the guidelines or the specific implementation strategies used in individual practices.

Participation in audit

In primary care, clinical audit is not compulsory although medical audit advisory groups were set up to support practices participating in audit (Department of Health, 1990). Despite audit being promoted in general practice for the past eight years, our survey confirms that many doctors still remain unconvinced of the value of audit (Butler et al, 1997; Chambers et al, 1996), with only half of all practices taking part in multi-practice audit of diabetes. Surveys of audits in primary care have shown wide variation in the

quality and quantity of audit performed by general practitioners (Baker et al, 1995; Webb et al, 1991). Concerns about audit include uncertainty about its nature or relevance, concern about failures or mistakes being disclosed through the audit process, resistance to change, limitations of resources, limitations of time and problems of implementation due to poor organisation and communication within practices (Chambers et al, 1996). Single topic audits organised by MAAGs can encourage large numbers of GPs to participate and successfully bring about change in behaviour with resulting improvements in standards of care (Chapter One). This survey shows that many practices are involved in clinical effectiveness programmes for diabetes in primary care. Our survey confirms that larger and more developed practices are more likely to participate in audit (Baker, 1992; Davies et al, 1996). In addition our survey shows that participation is associated with having a GP interested in the clinical topic being audited and in less socio-economically deprived areas. Recent studies (Robinson et al, 1998; Chaturvedi et al, 1998) have confirmed the existence of an inverse socio-economic mortality gradient in people with diabetes. Our study shows that practices with disadvantaged patient populations, and therefore the greatest need, are less likely to have fully implemented clinical governance programmes.

Conclusions

The recent White Paper sets out ambitious proposals aimed at delivering clinically effective care to patients (Department of Health, 1998a). Having a guideline, or undertaking audit are activities that form part of a clinical governance. Furthermore, guidelines and audit should be used systematically and together (Baker and Fraser, 1995). Efforts are required to encourage GPs to conduct audit and to convince them of

the value of multi-practice audit including diabetes (Butler et al, 1997; Davies et al, 1996; Whitford et al, 1995). Those involved in implementation of clinical governance programmes and NSF for diabetes will need to work with PCGs to continue to encourage active participation and to seek ways of encouraging involvement in audit of current non-participants. Resources may need to be targeted at smaller practices and practices in socio-economically deprived areas. The success of clinical governance and NSF for diabetes will depend on the development of effective implementation programmes by health authorities and PCGs, that are intended for all practices rather than only those that are already well developed.

5.3. Which practices provide systematic care for people with diabetes?

5.3.1 Introduction

Donabedian classified the constituents of care into structure, process and outcome (Chapter One). There are no recognised definitions of systematic care in diabetes although most published articles refer to systematic care as the process and intermediate outcome of diabetes care (Koperski, 1992; Kemple, 1993). However, in this Chapter, I have defined systematic care as the provision of "structures" for providing diabetes care. Chapter 6.3 describes the process and intermediate outcomes of care. CSAG (1994) described care structures of diabetes care as being availability of diabetes registers, chiropody and dieticians. The Health Service Guidelines (NHS Executive, 1997a) also identified key service structures as being "the availability of experiences and appropriately trained primary care teams, community staff, dieticians, chiropodists, optometrists". Practices with a recall system and a diabetes mini-clinic have been shown to achieve better glycaemic control of their patients and higher compliance with process criteria (Chapter One). A recent meta-analysis concluded that structured primary care involving central computerised recall and review of people with diabetes can achieve outcomes as good as or better than hospital care (Griffin, 1998). Farmer and Coulter (1990) showed that organised diabetes care is associated with reduced rates of hospital admission. This study also found that practices with a dietician and a chiropodist had lower admission rates. In the UK, new national strategies for public health have been drawn up with the intention to tackle inequalities with the aim of improving the health of the worst off in society and to narrow the health gap (Secretary of State for Health, 1998). When inequalities are identified, purchasers can carry out collaborative audits

with providers to determine the appropriateness of care received by their residents (Majeed et al, 1994a). One study showed that practices providing diabetes chronic disease management programmes are larger and in more affluent areas (Goyder et al, 1996). Currently little is known about the characteristics of practices that provide systematic care including recall and specific diabetes clinics to people with diabetes. There is also very little information about the provision of diabetes care teams within primary care.

5.3.2 Aim

1. To determine how services for people with diabetes are organised in primary care

2. To determine whether there are inequalities in systematic care of people with diabetes.

5.3.3 Method

The method is described in detail in Chapter Four. Diabetes miniclinic was detailed in the questionnaire as "a special session dedicated to their care [people with diabetes], for example nurse run clinics". Associations between variables were sought using chi-square tests and unpaired t-tests for comparison of means. Odds ratios were calculated for univariate variables. Multiple logistic regression was employed to determine which factors were independently associated , in a multi-variate analysis, with having a diabetes recall system or a diabetes mini-clinic as dependent variables. Variables were included if there was a significant association in univariate analysis at a significance level of 0.05 or if they were likely cofounders. Explanatory variables were tested in a forward stepwise regression analysis.

5.3.4 Results

Questionnaire response

The response rate and characteristics of responders and non responders are detailed in Chapter 5.2.

Recall system and diabetes mini-clinic

Of the responders 251 (95.1%) practices had a register of patients with diabetes. A recall system was employed by 236 (89.4%) practices, 196 (74.2%) reviewed their patients in a diabetes mini-clinic and 65 (24.6%) reviewed their patients in routine clinics or surgeries. Nearly all (97.6%) practices were approved for the chronic disease management programme. Table 5.7 shows results of univariate analysis of factors associated with having a recall system. Practices with a diabetes mini-clinic were significantly more likely to have a recall system than those without (93.9% vs 76.4%; OR 4.7, 95% CI 2.1 to 10.6; p=0.0002). Multiple logistic regression showed that having a recall system was independently associated with a presence of a GP (OR 6.2; 95% CI 2.6 to 14.9; p=0.0001) or a practice nurse (OR 3.5; 1.4 to 8.7; p=0.008) with an interest in diabetes. The adjusted R^2 for having a recall system with these two variables was 20.0%.

Table 5.8 shows the results of univariate analysis of factors associated with having a diabetes mini-clinic. Multiple logistic regression showed that having a diabetes mini-clinic was independently associated with a GP with an interest in diabetes (OR 4.1; 2.1 to 7.8; p<0.0001), a practice nurse having attended a diabetes course (OR 2.8; 1.3 to 6.2; p=0.01), practices with more partners (OR 1.2 per additional partner; 1.0 to 1.4

p=0.04) and in fundholding practices (OR 2.6; 1.2 to 5.5; p=0.01). The adjusted R^2 for having a diabetes mini-clinic with these four variables was 25.2%.

A glucometer was available in 82.0% (214/261) of practices. Practices possessing a glucometer were larger (mean list size (1000's): 7.3 vs 4.9; OR 1.2; 1.1 to 1.3; p=0.01) and had a lower Jarman Score (mean 2.5 vs 8.2; p= <0.05) and Townsend Score (mean 0.4 vs 1.7, p<0.05; p <0.01). Practices with a diabetic mini-clinic were also more likely to have a glucometer (OR 2.6, 1.3 to 5.0; p<0.01).

Diabetes multidisciplinary team

In 175 (67.8%) practices there was at least one partner who had an interest in diabetes and in 69.2% (162/234) practices, at least one partner had been on a diabetes course. A nurse with an interest in diabetes was present in 226 (85.6%) practices and a nurse had been on a diabetes course in 225 (85.2%) of practices. In 80.6% (125/155) of practices, a partner had been on a diabetes course in the last three years and in 90.6% (192/212) a nurse had been on a course in the last three years. Table 5.9 shows other members of diabetes teams either based at the practice or referred to outside the practice. Table 5.10 shows the characteristics of practices having a practice-based chiropodist or dietician.

TABLE 5.7 Univariate analysis of practice factors associated with having a diabetes recall system (n=264).

	Yes (236)	No (28)	OR (95% CI)
Partner with an interest with diabetes (%)	167/230 (72.6)	8 (28.6)	6.6 (2.8 to 15.8)[c]
Partner attended diabetes course (%)	153/211 (72.5)	9/23 (39.1)	4.1 (1.7 to 9.8)[b]
Nurse with a special interest in diabetes (%)	208 (88.1)	18 (64.3)	4.1 (1.7 to 10.0)[b]
Nurse attended diabetes course (%)	207/234	98 (64.3)	4.2 (1.8 to 10.2)[b]
Fundholding practice (%)	85 (36.0)	8 (28.6)	1.4 (0.6 to 3.3)
Training practice (%)	62/232 (26.7)	3 (10.7)	3.0 (0.9 to 10.4)
Computerised practice (%)	214/232 (92.2)	23 (82.1)	2.5 (0.9 to 7.6)
Mean list size (1000's) [SD]	7.2 [4.4]	4.8 [4.0]	1.18 (1.0 to 1.3)*[a]
Mean number of GPs [SD]	3.84 [2.3]	3.04 [2.1]	1.5 (0.1 to 3.2)[†]
Mean Wte nurse [SD]	1.84 [2.0]	2.1 (1.7)	1.0 (0.8 to 1.1)[†]
Mean Jarman Score [SD]	3.7 [14.0]	3.4 [16.2]	1.00 (1.0 to 1.0)[†]
Mean Townsend Score [SD]	0.7 [3.0]	0.3 [3.6]	1.04 (0.9 to 1.2)[†]

* Odds ratio for an additional 1000 patients   † Odds ratio for unit increase

[a] p<0.05   [b] p<0.01   [c] p<0.001

TABLE 5.8 Univariate analysis of practice factors associated with having a diabetes mini-clinic (n=264).

	Yes (196)	No (68)	OR (95% CI)
Partner with an interest with diabetes (%)	146/192 (76.0)	29/66 (43.9)	4.0 (2.2-7.3)[c]
Partner attended diabetes course (%)	130/176 (73.9)	32/58 (55.2)	2.3 (1.2-4.3)[b]
Nurse with a special interest in diabetes (%)	172 (87.8)	54 (79.4)	1.9 (0.9-3.8)
Nurse attended diabetes course (%)	175 (90.2)	50 (73.5)	3.3 (1.6-6.8)[b]
Fundholding practice (%)	80 (40.8)	13/55 (19.1)	2.9 (1.5-5.7)[b]
Training practice (%)	57 (29.4)	8/66 (12.1)	3.0 (1.4-6.7)[b]
Computerised practice (%)	178 (91.8)	59/66 (86.8)	1.2 (0.5-2.9)
Mean list size (1000's) [SD]	7.4 [4.3]	5.4 [4.4]	1.1 (1.0-1.2)[*a]
Mean number of GPs [SD]	4.1 [2.2]	2.88 [2.2]	1.3 (1.1-1.5)[†b]
Mean Wte nurse [SD]	2.0 [2.1]	1.6 [1.5]	1.1 (0.9-1.4)[†]
Mean Jarman Score [SD]	2.71 [13.6]	6.5 [15.7]	1.0 (0.96-1.0)[†]
Mean Townsend Score [SD]	0.5 [3.0]	1.3 [3.4]	0.9 (0.8-1.0)[†]

* Odds ratio for an additional 1000 patients   † Odds ratio for unit increase

[a] $p < 0.05$ [b] $p < 0.01$ [c] $p < 0.001$

TABLE 5.9 Members of diabetes team present in the practice or referred to by the practice (n=264). Values are numbers (%)

	Present in practice	Referred to
Chiropodist	116 (43.9)	145 (54.9)
Dietician	90 (34.1)	166 (62.9)
Ophthalmologist	9 (3.4)	238 (90.2)
Optician	5 (1.9)	210 (79.8)
Optometrist	6 (2.3)	186 (70.7)
Diabetes health visitor	19 (7.2)	138 (52.5)

TABLE 5.10 Characteristics of practices having practice based chiropodist or dietician (n=264).

	Chiropodist		Dietician	
	Yes (116)	No (148)	Yes (90)	No (174)
Fundholding practice (%) (n=95)	36.2	34.5	35.5	35.1
Training practice (%) (n=65)	31.3	20.0 [a]	38.2	18.1 [b]
Mean list size	7639.6	6259.2	8202.7	6176.5 [b]
Mean Townsend Index	-0.01	1.2 [b]	0.1	1.0 [a]
Mean Jarman Score	0.09	6.5 [c]	1.1	4.9 [a]

[a] $p < 0.05$ [b] $p < 0.001$ [c] $p < 0.0001$

5.3.4 Discussion

This section reports a survey of differences between practices that offer systematic care defined as the necessary structures for delivering quality diabetes care to people with diabetes and those that do not. Systematic diabetes care requires good organisation and co-operation between members of the primary health care team. This survey of 264 practices in three different health regions shows that many practices are well organised in providing systematic diabetes care. Some factors associated with the provision of systematic diabetes care were expected. However, there are differences between practices that provide systematic care and those that do not.

Limitations

There have been detailed in Chapter 5.2.

Diabetes recall and mini-clinic

Previous studies have indicated that one of the major problems with the provision of comprehensive and systematic diabetes care in general practice is the lack of organisation (Day et al, 1987; Whitford and Avery, 1989). Larger practices and practices with GPs or nurses with an interest in diabetes are more likely to have organised routine recall of patients and to operate diabetes mini-clinics. However, the models used in this study explained only a small part of variation in practices possessing a recall system or a diabetes mini-clinic. Variations are therefore also likely to be due to other not accounted factors. An earlier survey in 1988 reported that only 14% of practices offered diabetes mini-clinics, a quarter kept a diabetes register but fewer had a system of recall to enable anticipatory care (Chesover et al, 1991). Our study is in agreement with the recent

survey of 45 practices in Poole (Dunn and Bough, 1996) and shows that many GPs are now organised to provide systematic diabetes care. Payment for chronic disease management (Department of Health, 1992) may have influenced the increase in numbers of practices providing a diabetes mini-clinic and recall system. Although a recall system (Griffin, 1998) and diabetes mini-clinics (Pringle et al, 1993; Williams et al, 1990; Farmer and Coulter, 1990) have been shown to promote better care, a recent descriptive study from Poole of 37 practices showed that improved organisation of care was associated with improved process but not outcome of care for patients with diabetes (Dunn and Pickering, 1998). Pringle et al (1993) showed that glycaemic control was better in better equipped practices but, many practices do not possess glucometers despite these machines being relatively inexpensive. Practices possessing glucometers were larger and in more affluent areas.

Multi-disciplinary diabetes team

Previous studies have shown that one major barrier to providing systematic care to people with diabetes was the lack of specific skills (Stead et al, 1991; Jones and Marsden, 1992; Chesover et al, 1991). As there is an increase in the proportion of patients being reviewed in primary care and an increase in transfer of patients from secondary care to primary care (Goyder et al, 1998), it is important to ensure that primary care is adequately resourced to provide high quality care. This study shows that many practices do not have readily available access to dieticians, chiropodists and optometrists. A previous study from Poole found that only 42% of practices had primary care chiropody service for diabetic foot examination and 51% had an optometrist available for diabetic eye examination (Dunn and Pickering, 1998). However, this study

did not report whether these professionals were present within the practice or were available for referral outside the practice.

Only a few (14%) practices in our study had practice based access to ophthalmologic services. Because lack of time and expertise are barriers to diabetic retinopathy screening (Stead et al, 1991; Jones and Marsden, 1992; Chesover et al, 1991) one method of improving screening in primary care may include providing easy access for retinopathy screening by practice attached ophthalmological services or an annual retinal photography service (Burnett et al, 1998). Practices with access to dietetic services have been shown to have better glycaemic control than those without (Pringle et al, 1993; Chesover et al, 1991). However, less than half the practices provided practice based chiropody and dietetic services. Practices with a practice based chiropodist or dietician were larger, better organised and in less deprived areas. The perceived need for involvement of diabetes specialist nurses was low, a finding that is similar to a previous study (Carr et al, 1991).

Any team caring for patients with diabetes must receive annual continuing medical education in diabetes (CSAG, 1994). The final report of the St. Vincent Joint Task Force for diabetes care in the UK also emphasised the need for up-to-date and continuing education (The St. Vincent Task Force, 1995). Furthermore, Carney and Helliwell showed that structured educational programmes involving all professionals can lead to improved clinical care for people with diabetes (Carney and Helliwell, 1995). In our study just over two-thirds of general practitioners and 85% of nurses professed to an interest in diabetes and had been on a diabetes course. The recent report *Continuing*

Professional Development in General Practice proposes practice based education (Chief Medical Officer, 1998). This would give an opportunity to focus on developing all aspects of diabetes care with emphasis on education with a multi-disciplinary practice diabetes team.

Pringle and colleagues (1993) found that doctors who professed a special interest in diabetes achieved better glycaemic control among their patients and suggested that diabetes care should be led by partners with a special interest in diabetes. Our study shows that general practitioner or nurse interest influenced the provision of systematic care. As the majority of patients in primary care have Type 2 diabetes, all health authorities and their primary care groups will need to provide comprehensive diabetes care to meet the tight targets achieved in the UKPDS (UKPDS 33, 1998; UKPDS 38, 1998) and in the implementation of the proposed NSF for diabetes.

Conclusion

In agreement with previous research on diabetes, this study shows that practices in more deprived areas still lag behind practices in more affluent areas in terms of the structure of services for diabetes (Leese and Bosanquet, 1995). Providing high quality primary care is essential to meeting the Government's agenda of reducing inequalities (Secretary of State for Health, 1998). Recent studies (Robinson et al, 1998; Chaturvedi et al, 1998) have also confirmed the existence of an inverse socioeconomic mortality gradient in people with diabetes. Furthermore, the prevalence of Type 2 diabetes may be affected by socio-economic factors with a higher prevalence in practices in more deprived areas (Meadows, 1995). This study shows that those practices with the greatest need have

poor access to members of the diabetes team. One of the major barriers to the provision

of diabetes care in general practice is the lack of organisation. Delivery of systematic

care must also include provision of continuous diabetes education to diabetes teams This

study has identified key factors associated with service delivery and systematic

organisation of care of people with diabetes. To improve care, the deficiencies and

inequalities highlighted in our survey must be addressed. The results of this survey will

be valuable to PCGs, those responsible for implementing NSF for diabetes and

organisations responsible for commissioning diabetes services. PCGs may need to

employ trained practice nurses, diabetes specialist nurses and optometrists who would be

shared between practices to run diabetes clinics if not already available. PCGs may also

wish to consider setting up a centralised recall system to improve care of people with

diabetes within their own community.

CHAPTER SIX:

FACTORS ASSOCIATED WITH VARIATIONS IN

PREVALENCE, DELIVERY AND QUALITY OF CARE OF

PEOPLE WITH DIABETES

6.1 Factors affecting variations in prevalence of diabetes

6.1.1 Introduction

In Chapter One it was suggested that the prevalence of diabetes will rise in the next millennium, largely as a result of a rise in the prevalence of type 2 diabetes. The cost of diabetes already accounts for 5% of the total health care budget and as prevalence increases, the health care cost of diabetes will also rise. Accurate data on the prevalence of diabetes are therefore essential for health care planning and appropriate distribution of health care resources.

Chapter One discussed the various methods used to detect patients with known diabetes and how they may influence the prevalence of this condition. Chapter 3.1 showed that the prevalence and treatment rates of diabetes can be assessed and compared using data from multi-practice audits. These estimations compared well with other community-based estimations of the prevalence of diabetes. Most prevalence studies do not discuss variations in prevalence between practices. A small number of previous studies have shown that there are variations in prevalence of diabetes and these rates vary appreciably between practices because of the age structure (Croxon et al,1991) and the ethnic group of patients within practices (Simmons et al, 1991; Unwin, 1998), and deprivation (Meadows, 1995). However, a large cross sectional postal survey in Avon and Somerset failed to find an association between deprivation and the prevalence of self-reported diabetes (Eachus, 1996). This study ascertained self-reported health status by a postal questionnaire with validation of 20% sample with general practice notes and the results therefore have limitations. The validation of the questionnaire with general practice and

hospital records was only conducted for 127 people with diabetes. The sensitivity reported was only 69%. The same study however, did find a social class gradient for diabetic eye disease.

6.1.2 Aims

1. To collate data from multi-practice audits undertaken in three regions in England to estimate in each participating practice the prevalence and treatment of known diabetes.

2. To determine whether there was an association of prevalence of diabetes with increased socio-economic deprivation.

6.1.3 Methods

These are detailed in Chapter Four.

Data Analysis

Data were analysed using SPSS for Windows (version 8). Prevalence of diabetes was determined for each practice and for each of the three regions. Statistically significant associations between the overall prevalence of diabetes and different categorical variables were sought using unpaired t-test. Multiple linear regression was used to determine which factors were independently associated with the prevalence of diabetes (Altman, 1994). The Townsend Score was used in the regression model because it measures material deprivation independent of age and ethnicity. Age and ethnicity components of the Jarman Score were also used in the final model.

6.1.4 Results

The three health authorities included 327 practices (numbers in each health authority: 87, 88, 156) and the practices in the three health authorities served a total population of over two million people.

One hundred and sixty-nine practices had conducted an audit (Chapter 5.2). However, 15 (8.9%) practices had only audited a sample of their patients with diabetes and were therefore excluded from this present study because the total prevalence could not be ascertained. The differences between practices for whom the prevalence of diabetes could be ascertained and to those it could not be are shown in Table 6.1. The total list size of these remaining 154 practices was 1,019,461 (range between practices 840 to 23340). Two audit groups supplied data for 9843 patients from 108 practices to determine the sex distribution of diabetes mellitus. The overall male to female ratio was 1.15:1. Treatment of diabetes could be ascertained for 131 practices. Figure 6.1 shows the frequency histogram of prevalence of diabetes for the 154 practices. Table 6.2 shows the prevalence of diabetes and its treatment for the three regions. There was a significant difference in prevalence between the three health regions (χ^2 222.9, df 2, P<0.0001). However, these differences may not be clinically significant because of the large denominators. Table 6.3 shows the results of multiple regression including the variables which might be expected to be independent predictors of practice prevalence: proportion of population over 65, proportion ethnic minorities and Townsend Score. Fifteen percent of variability in prevalence was explained by these three variables.

TABLE 6.1 Characteristics of practices for whom prevalence could be ascertained

Prevalence ascertained	Leicester (n=152) Yes	No	Durham(n=87) Yes	No	Suffolk(n=88) Yes	No	Total (n=327) Yes	No
Number Fundholding (%)	20/52 (38.5)	39/100 (39.0)	18/56 (32.1)	11/31 (35.5)	11/46 (23.9)	11/42 (26.2)	49/154 (31.8)	61/173 (35.3)
Number Training (%)	7/52 (13.5)	20/100 (20.0)	12/56 (21.4)	9/30 (30.0)	21/44 (47.7)	10/40 (25.0)	40/152 (26.3)	39/170 (22.9)
List Size (1000's) [SD]	5.3 [2.8]	6.5 [4.9]	6.6 [4.8]	7.3 [4.4]	8.2 [3.7]	6.7 [3.4]	6.6 [4.0]	6.7 [4.5]
% Ethnicity[†] [SD]	11.6 [13.6]	12.4 [15.8]	0.6 [0.5]	0.9 [1.0]	1.7 [1.6]	1.7 [1.6]	4.7 [9.4][a]	8.0 [13.4][a]
% Population over 65[†][SD]	14.4 [2.1]	14.1 [2.0]	16.9 [4.3]	15.8 [3.7]	18.9 [5.3]	16.9 [4.1]	16.6 [4.4][b]	15.1 [3.1][b]
Total no. of GPs [SD]	3.0 [1.6]	3.6 [2.6]	3.4 [2.3]	3.8 [2.3]	4.6 [1.4]	3.6 [1.8]	3.6 [2.0]	3.6 [2.4]
Jarman Score [SD]	4.8 [15.8]	5.6 [17.1]	3.0 [13.8]	9.3 [11.4]	-0.5 [6.7]	0.3 [8.3]	2.6 [13.1]	4.9 [14.8]
Townsend Score [SD]	0.5 [3.5]	0.8 [3.7]	0.4 [2.9]	1.7 [2.0]	0.4 [1.5]	0.7 [2.3]	0.4 [2.8]	1.0 [3.2]

Independent sample t-test [a]p=0.01, [b]p=0.001

[†]Components of the Jarman Score

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6.1.5 Discussion

The prevalence of Type 2 diabetes mellitus has increased dramatically over the past decade (Gattling et al, 1998). This study collated primary care audit data to describe the prevalence and treatment of known diabetes. Diabetes places a considerable demand on primary health care teams, and there is evidence of an increase in both case finding and the proportion of patients being reviewed in general practice (Goyder et al, 1998). This study suggests that variation in age structure of the practice population explains some of the variation in prevalence. However the study found no evidence that practice prevalence was associated with practice deprivation indicators.

Limitation of this study

Chapter 3.1 discussed sources of potential bias in this type of prevalence estimations and include diagnostic bias, selection bias, and information bias. However, these sources of bias would not necessarily be expected to vary systematically with practice characteristics, such as deprivation score. The proportion of people with diabetes treated by diet, hypoglycaemic drugs and insulin is comparable with previous studies (Chapter 3.1). There may be two reasons why our study failed to show a significant association of prevalence with ethnicity. Firstly, practices for which the prevalence could be ascertained had significantly lower proportion of ethnic patients than for those where prevalence could not be ascertained. Secondly the ethnicity component of the Jarman Score may be crude and insensitive to detect small changes in prevalence. The observation that the area with the lowest overall prevalence also had the lowest proportion of insulin treated patients suggests that diagnostic bias is not the explanation for variation in prevalence between areas.

FIGURE 6.1 Frequency histogram of prevalence of diabetes (n=154 practices)

Prevalence of diabetes
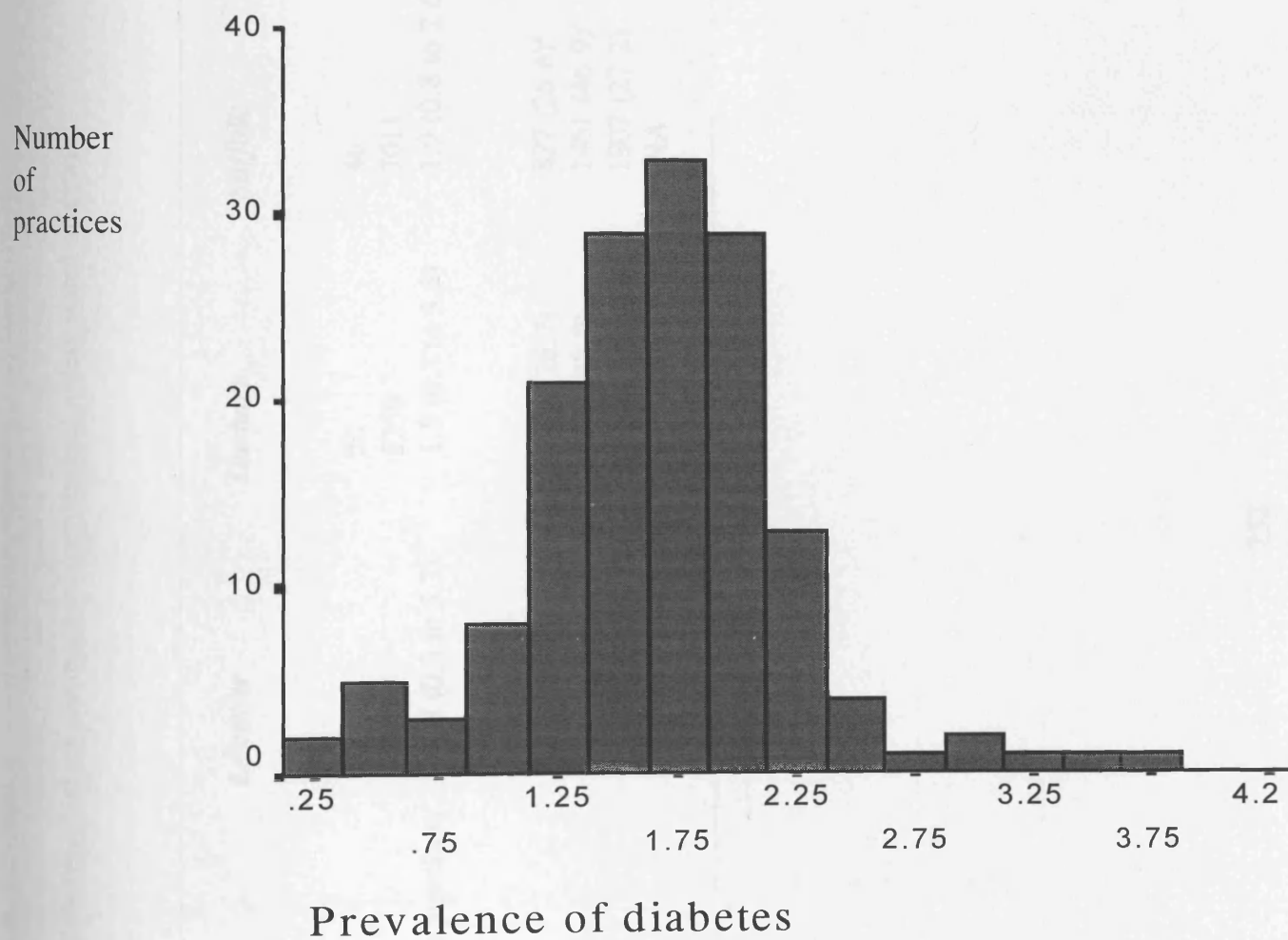
TABLE 6.2 Prevalence and treatment of diabetes. Values are numbers (percentage) unless stated otherwise.

	Leicester	Durham	Suffolk	Total
Number of practices	52	56	46	154
Number of people with diabetes	4646	5250	7011	16907
Prevalence of diabetes (range between practices)	1.8 (0.3 to 5.7)	1.5 (0.3 to 3.5)	1.9 (0.8 to 2.6)	1.7 (0.3 to 5.7)
Treatment of diabetes				
Diet controlled	1098 (23.6)	1403 (26.7)	827 (26.6)[a]	3328 (25.6)[b]
On oral hypoglycaemic drugs	2100 (45.2)	2569 (48.9)	1461 (46.9)[a]	6130 (47.1)[b]
Insulin treated	1390 (29.9)	1240 (23.6)	1907 (27.2)	4537 (26.8)
Not known	58 (1.3)	38 (0.7)	NA	NA

[a] Data available for 23 practices

[b] Data available for 131 practices

NA Not applicable

TABLE 6.3 Multivariate associations between diabetes prevalence and practice characteristics.

Characteristic	R^2 (%)	Unadjusted B Coefficient	Adjusted* B Coefficient	95% CI	p
% population over 65[†]	12	0.052	0.065	0.039 to 0.92	<0.0001
% Ethnicity[†]	1.0	0.002	0.001	-0.016 to 0.14	0.9
Townsend Score	2.4	0.006	0.009	-0.35 to 0.053	0.7

*Adjusted for health authority and all other variables in the table.

[†]Components of the Jarman Score

Case ascertainment

Because this study collated aggregated practice data, it was not possible to estimate age-adjusted rates. Under-ascertainment of known diabetes is inevitable in prevalence studies. However, a prevalence of 1.7% in this study from 154 practices is similar to rates found in other recent studies (Morris et al, 1997; Gatling et al, 1998). For accurate prevalence studies, the case ascertainment should be as complete as possible. In this study, all available sources (Chapter 3.1) were used to develop a diabetes register and all patients (Type 1 and Type 2) were included for the prevalence estimation. This study also shows that the prevalence of diabetes is higher in men than women, a finding similar to other recent studies (Chapter 3.1).

Prevalence of diabetes

In agreement with the study reported on Chapter 3.1, this study shows that the prevalence rates of chronic disorders can be assessed and compared at practice level using data from multi-practice audits. Individual practice level data in this study allowed reasons for these variations to be explored further.

This study shows that significant differences exist in prevalence of diabetes between practices and between geographical regions. Studies based upon small numbers are liable to under or over-estimate prevalence. In many studies reported in the literature, the methods of assessment have differed considerably and therefore the data are not directly comparable (Chapter One). One study that has reported an association between deprivation and prevalence was limited to only eight practices within one geographical area (Meadows, 1995). Other factors influencing prevalence might therefore be expected

to be more similar than in this present study. The finding in this present study suggest that this association is not present across a much larger and more varied sample of practices.

Conclusions

It has been previously argued that identification of all people with diabetes is within the competence of GPs and that audit groups might have a role in co-ordinating this process (Howitt and Cheale, 1993). Such data can be used for health needs assessment in the context of planning and delivering of health care to populations. This would estimate need in relation to specific problems using estimates of incidence and prevalence.

The findings of this study have important implications for allocation of health service resources. If general practitioners are to be equitably funded in the future, then consideration must be given to linking funding to morbidity. If improved care of people with diabetes would be best served in general practice, then payment for chronic disease management should be based per capita similar to payments for immunisations. Paying GPs to provide diabetes care per patient would be likely to encourage improved detection of and may also improve the accuracy of diabetes registers. People with diabetes consume nearly 9% of the NHS acute hospital revenue (Currie et al, 1997) Practices with a higher prevalence will also have increased hospital costs and these practices should also have increased allocation of budget for hospital activity. Further studies investigating the association of deprivation to the prevalence of diabetes are required.

6.2 Factors affecting variations in delivery of diabetes care

6.2.1 Introduction

The nature of work undertaken by different health professionals are constantly shifting (Hopkins et al, 1996) and for the past 15-20 years diabetes has been argued as a disease suitable for follow-up in primary care (Wilkes and Lawton, 1980). In addition, the prevalence of type 2 diabetes has also increased dramatically over the past decade (Gattling et al, 1998). GPs have therefore been encouraged to develop services for diabetes since 1993 with a specific payment for doctors offering structured diabetes care (NHS Management Executive, 1993a). As a result, the proportion of people with diabetes reviewed annually in primary care has increased (Goyder et al, 1998). Furthermore, patients also prefer to receive their diabetes care in general practice (Kinmonth et al, 1989; Murphy et al, 1992). There is also evidence that structured care in general practice can achieve good standards of care (Griffin, 1998). Shifting care from secondary care to primary care of people with diabetes can place considerable demands on primary health care teams. However, little is known about the proportion of people with diabetes being cared for in primary and secondary care and the variations between practices in caring for people with diabetes in primary care.

6.2.2 Aims

1. To estimate what proportion of people with diabetes are cared for in primary care, secondary care or shared care.

2. To determine associations of general practice care with practice characteristics, and with the prevalence and treatment of diabetes.

6. .3 Method

Practices from two audit groups (Leicester and Durham) provided information relating to delivery of care. Suffolk audit group did not collect data on where care was delivered. Since the taxonomy of shared care is not fully developed (Griffin, 1998), this study only explored variations in patients solely under GP care. Full details of methodology are detailed in Chapter Four. Multiple regression was employed to determine which factors were independently associated with general practice care.

6.3.4 Results

The two health authorities were responsible for 239 practices of which 123 had participated in the multi-practice audit. There was no significant difference in mean list size, number of GPs, number of whole-time equivalent nurses, Jarman Score, Townsend Score, fundholding status or training status between those practices that participated in the multi-practice audit to those that did not.

Data on the delivery of care were available for 9896 people with diabetes from 108 (87.8%) practices of which 27 (25.0%) were single-handed, 70 (64.8%) had 2 to 5 partners and 11 (10.2%) had six or more partners. The source of routine care was known for 9557 (96.6%) people with diabetes: 1184 (12.4%; 95% confidence interval 11.7 to 13.1; range between practices 0 to 69.4%) were under hospital care, 2332 (24.4%; 23.5 to 25.3; 0 to 88.0) were under shared care and 6041 (63.2; 62.2 to 64.2; 5.6 to 94.6) were under GP care. Figure 6.2 shows the frequency histogram of proportion of people with diabetes under GP care. Treatment was known for 9800 (99.0%) people with diabetes: 7170 (73.2%; 95% CI 72.3 to 74.1) were on diet or oral hypoglycaemic drugs

and 2630 (26.8%; 26.0 to 27.7) were insulin treated. Table 6.4 shows the univariate and multiple linear regression of factors associated with the likelihood of provision of care in general practice. Increased delivery of care in general practice is significantly associated with training practices, practices with greater number of whole time equivalent nurses, practices with a higher prevalence of diabetes and with a higher proportion of patients that are controlled diet or on oral hypoglycaemic drugs. There was no association of increased general practice care with fundholding practices, size of practice, number of partners or socio-economic deprivation.

6.2.5 Discussion

The prevalence of diabetes is set to rise in coming years, largely as a result of a rise in the prevalence of type 2 diabetes because of an increase in the proportion of people over 65. This is the first study to determine which practices deliver diabetes care entirely in general practice. This study shows that there are large variations in delivery of diabetes care. Chapter 6.1 showed that the prevalence and treatment of known diabetes in these practices is similar to rates found in other recent studies and the data are therefore likely to be representation of other practices in the UK. The sample of practices was typical of all practices in England in terms of number of partners, list size and fundholding status (NHS Executive, 1997b).

The health service guideline, *Key Features of a Good Diabetes Services* (NHS Executive, 1997a) explicitly stated that, in addition to providing structured care driven by best evidence and reflecting local needs, the service should be "primary care based".

FIGURE 6.2 Frequency histogram of proportion of people with diabetes under GP care (n=108 practices).
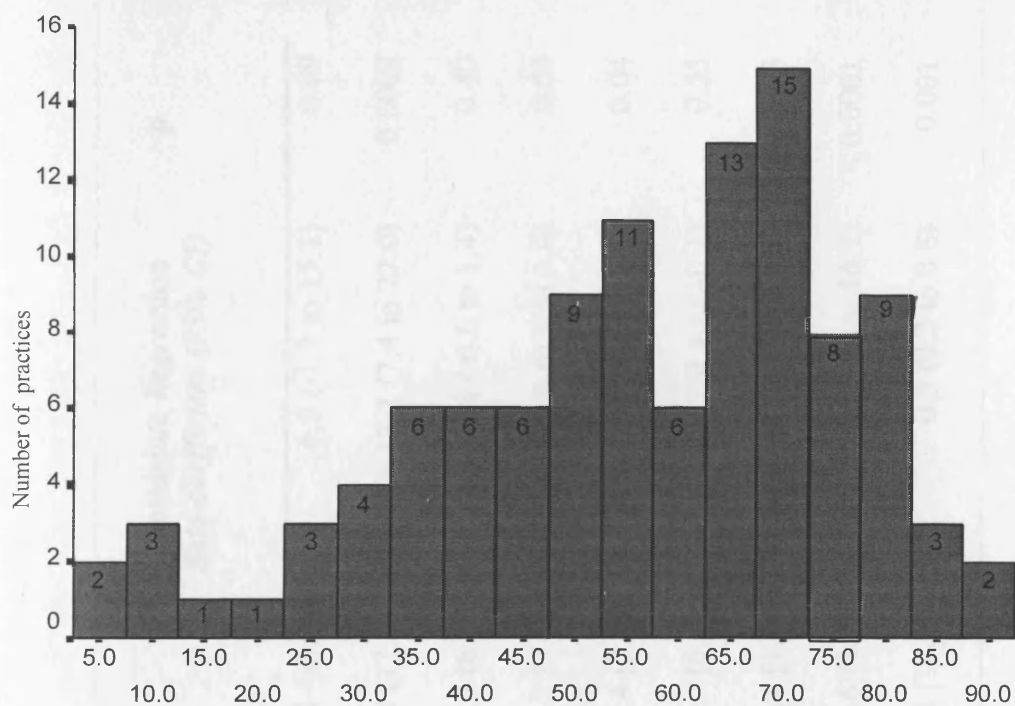
Percentage of people with diabetes under GP care

TABLE 6.4 Univariant and multiple linear regression of factors associated with primary care delivery of diabetes. (n=108 practice).

Values are mean [SD] unless stated otherwise.

		Univariate Regression Beta-coefficient (95% CI)	p	Multiple Regression[†] Beta-coefficient (95% confidence intervals)	p
Fundholding practice [Number (%)]	38 (35.2)	6.9 (-1.2 to 15.1)	0.09	-	-
Training practice [Number (%)]	19 (17.6)	17.2 (7.4 to 27.0)	0.0007	14.8 (6.4 to 23.2)	0.001
List size in 1000s	6.0 [6.7]	0.4 (-0.6 to 1.4)	0.40	-	-
Number of general practitioners	3.2 [3.6]	2.0 (0.1 to 3.9)	0.04	-	-
Number of whole time equivalent nurses	1.4 [2.1]	4.2 (0.3 to 8.1)	0.04	4.4 (1.1 to 7.6)	0.009
Jarman score*	3.9 [6.4]	-0.1 (-0.4 to -0.1)	0.35	-	-
Townsend score*	0.4 [1.0]	-0.8 (-2.0 to 0.5)	0.23	-	-
Prevalence of diabetes	1.6 [0.7]	11.1 (6.1 to 16.1)	<0.0001	8.1 (3.6 to 12.7)	0.001
Proportion of patients diet controlled or on oral hypoglycaemic drugs	73.2 [12.7]	0.5 (0.2 to 0.8)	0.001	0.4 (0.2 to 0.7)	0.001

*1991 enumeration district data.

[†] Four factors were independently associated with primary care delivery of diabetes (Adjusted R^2 32.9%).

However, for delivery of diabetes care in general practice, the practices need to be adequately resourced to deliver high quality care. People with diabetes also prefer a primary care based service. Despite the evidence that care can be as good as secondary care (Griffin, 1998) in terms of standards of care, this study shows there are wide variations in the provision of general practice diabetes care. Implementing the findings of the UKPDS (UKPDS 33, 1998;UKPDS 38,1998) will be a major task for primary care. Delivery of high quality care for all people with diabetes will demand considerable organisation, resources and education of primary care diabetes teams (Khunti, 1998).

One of the major problems with provision of comprehensive and systematic diabetes care in general practice is the lack of organisation. Nearly two-thirds of people with diabetes are cared for in general practice and accurate data on the type of practices offering general practice care are essential for health needs assessment, planning and the allocation of resources. A higher proportion of people with diabetes being cared for in general practice is associated with more organised practices with an increased level of nursing support and practices with a high prevalence of diabetes. Previous research has shown that practices in urban and inner city areas still lag behind practices in rural and suburban areas in terms of practice structure and service provision (Leese and Bosanquet, 1995). Chapter 5.3 showed that practices in socioeconomically deprived areas were less likely to have a practice based dietician or a chiropodist, However, this study shows that delivery of care of people with diabetes is not associated socioeconomic deprivation. Therefore, higher levels of deprivation are not a barrier to the provision of increased delivery of care in general practice.

Recent studies have shown the importance of tight glycaemic (UKPDS 33, 1998) and blood pressure (UKPDS 38, 1998) control. Chapter One discussed the advantages of a primary care led diabetes service and therefore implementing this evidence is best served in primary care. This will, however, place a heavy burden on an already stretched primary care diabetes teams. Furthermore, if there is an increase in transfer of patients from secondary care to primary care it is important to ensure primary care is adequately resourced to provide high quality of care (Goyder et al, 1998). The current payment for chronic disease management programme is insufficient and inequitable, and does not truly reflect where diabetes care is delivered. Chapter 6.1 discussed linking a payment for chronic disease management as a method of improving detection and accuracy of diabetes register. Linking a payment to where care is delivered may encourage increased level of care of people with diabetes in general practice. Chapter 6.3 studies the variations in process and intermediate outcome of care of people with diabetes and will determine the quality of care associated with the proportion of people with diabetes under GP care.

6.3. Factors affecting variations in quality of care of people with diabetes

6.3.1 Introduction

Audits have demonstrated that wide variations exist in care of people with diabetes between practices, and between different health regions (Chapter One and Chapter 3.2). Chapter 1.8 showed that most studies investigate single factors associated with the quality of diabetes care. Two previous studies have shown that practice, patient or organisational factors may influence the level of care of patients with diabetes (Pringle et al, 1993; Dunn and Pickering, 1998). However, these studies have been conducted in single geographical areas and in a small number of practices. Furthermore, the social and demographic characteristics of general practice populations may also help to explain some of the variations seen in the care of people with diabetes and in the performance of GPs, but such studies have not been conducted. In the UK, new national strategies for public health have been drawn up to tackle inequalities with the aim of improving the health of the most deprived to narrow the health gap (Secretary of State for Health, 1998). When inequalities are identified, purchasers should undertake audits with providers to determine the appropriateness of care received by their residents (Majeed et al, 1994a).

The delivery of care to people with diabetes is complex with many factors influencing care. To improve care, information is required about the obstacles to change faced by practices. Data about the populations served by individual practices are required to improve current understanding of patient and practice characteristics that influence why process and outcome measures vary so widely between general practices. The

complexity of delivery of care to people with diabetes was illustrated in Chapter 4.1 which identified 54 factors that may influence quality of care.

6.3.2 Aim

1. To collate individual practice level data from practices that had taken part in a multi-practice audit to determine the standard of diabetes care in primary care.

2. To determine which features of practices are associated with delivering good quality care.

6.3.3 Method

The methodology of identifying factors relating to quality of diabetes care and of obtaining audit data, routine health authority data and practice data are described in Chapter Four. The factors about which information was sought from the audit group, the health authority and the practice questionnaire survey are listed in Box 6.1.

Data analysis

Analysis was carried out using SPSS for Windows (version 8). Univariate associations between variables were sought using chi-squared tests for categorical variables and t-tests for continuous variables for each of the process and intermediate outcomes of care. Multiple linear regression was employed to determine which factors were independently associated, in a multi-variate analysis, with the process and intermediate outcome of care. Variables were included if there was a significant association in univariate analysis at a significance level of 0.05 or if they were likely cofounders. Explanatory variables were tested in a forward stepwise regression analysis.

6.3.4 Results

The three health authorities were responsible for 327 practices of which 264 responded to the questionnaire survey (full details are presented in Chapter Five). The practices in the three health authorities served a population of over two million people. One hundred and sixty-nine practices (51%; proportion taking part in each health authority: 44%, 52%, 64%) had conducted an audit of people with diabetes of which 83% (149/169) responded to the questionnaire. Table 6.5 shows the characteristics of the practices that participated in a multi-practice audit and comparable figures for England.

As the taxonomy of shared care is not clear (Griffin, 1998), delivery of care was defined as GP care only or hospital care (Chapter 6.2). 169 practices supplied data relating to 18642 people with diabetes: 5760 (30.9%) were under hospital care and 11155 (59.8%) were under general practice care. The source of care was not known for 1727 (9.3%) patients. Table 6.6 shows the level of compliance with the process and outcome measures. Figures 6.3 to 6.8 show histograms of compliance with process and intermediate outcome measures.

Table 6.7 shows the multiple regression analysis of factors associated with process and outcome of care. The results show that practices with a smaller proportion of patients under hospital care were associated with better process and intermediate outcome of care. Fundholding practices and practices with a recall system were associated with better annual compliance of some process measures. Smaller practices have higher compliance with annual assessment of glycated haemoglobin and blood pressure. Practices with higher socioeconomic deprivation perform poorly for most process measures.

Intermediate outcome of care was only associated with the proportion of patients under hospital care. Being a training practice, having a diabetes mini-clinic, having more nurses, personal care and GP or nurse interest in diabetes were not associated with process or outcome of care.

However, the models in Table 6.7 only explained a small proportion of the variability (2.4%-27.4%). Figure 6.9 shows a scatter pilot of percentage of patients who had a glycated haemoglobin checked in each practice against the percentage of patients who had a normal glycated haemoglobin. There was no significant association between these two variables (Beta coefficient 0.13; 95%, -0.09 to 0.34).

Box 6.1 Information obtained from audit groups, health authorities and the practices.

Audit Group[a]	Practice[b]	Health Authority
Process of care data: Annual compliance with • Fundi check • Glycated Hb check • Feet check • BP check • Urine check	Recall system Diabetes mini clinic Presence of a dietician GP interest in diabetes GP course in diabetes Nurse interest in diabetes Nurse course in diabetes 　Presence of protocol/guideline	Jarman Score Townsend Score List size Number of partners Wte nurses Practice manager Training status Fundholding status
Outcome of care data Proportion of patients with a normal Glycated haemoglobin[c] Prevalence of diabetes Delivery of care of people with diabetes: 　GP care 　Hospital care 　Shared care	Presence of glucometer Personal list system	

[a] For practices that had conducted a multi-practice audit

[b] For all practices that responded to the questionnaire survey

[c] Since normal ranges for glycated haemoglobin vary between different centres (Butler et al, 1995), the cut off for the respective local laboratories was taken as normal

TABLE 6.5 Characteristics of practices that participated in the multi-practice audit compared with practices in England.

No. of partners		England
Single handed	17.0%	30.5%
2-6 partners	74.5%	63.9%
>7 partners	8.4%	5.6%
Average list size per partner	1862	1885
Training practice*	26.3%	23%
Fundholding**	34.9%	41%
Approved for chronic disease management (diabetes)	99.4%	94%
Mean Jarman Score (Range)†	2.4 (-37.3 to 42.3)	0 (-45.5 to 66.0)
Mean Townsend Score (Range)†	0.4 (-5.8 to 9.7)	0 (-8.8 to 13.7)

*   (NHS Executive, 1997b)

** NHS Annual Report 1995-6, NHS Executive: Leeds, 1996

†   Jarman and Townsend Scores for electoral wards in England were supplied by Office for National Statistics

	No. of practices	No. of people with diabetes	Median compliance of practices (%) (interquantile range)	Mean compliance by audit group		
				A	B	C
Fundi checked	160	18746	64.6 (45.3 to 77.8)	62.2	68.8	50.6
Urinanalysis checked	162	18381	71.4 (49.7 to 84.3)	63.9	77.8	53.0
Feet checked	162	18504	70.4 (51.0 to 84.4)	64.3	79.3	53.6
Blood pressure checked	106	13352	83.6 (66.7 to 91.5)	85.0	NA*	64.8
Glycated haemoglobin checked	165	19174	83.0 (69.4 to 92.0)	80.6	88.6	59.1
Glycated haemoglobin normal	123	9665	42.9 (33.0 to 51.2)	44.1	41.5	NA*

*Criterion not audited.

FIGURE 6.3. Histogram showing percentage compliance with annual examination of fundi. Data are for individual practices (n=160)
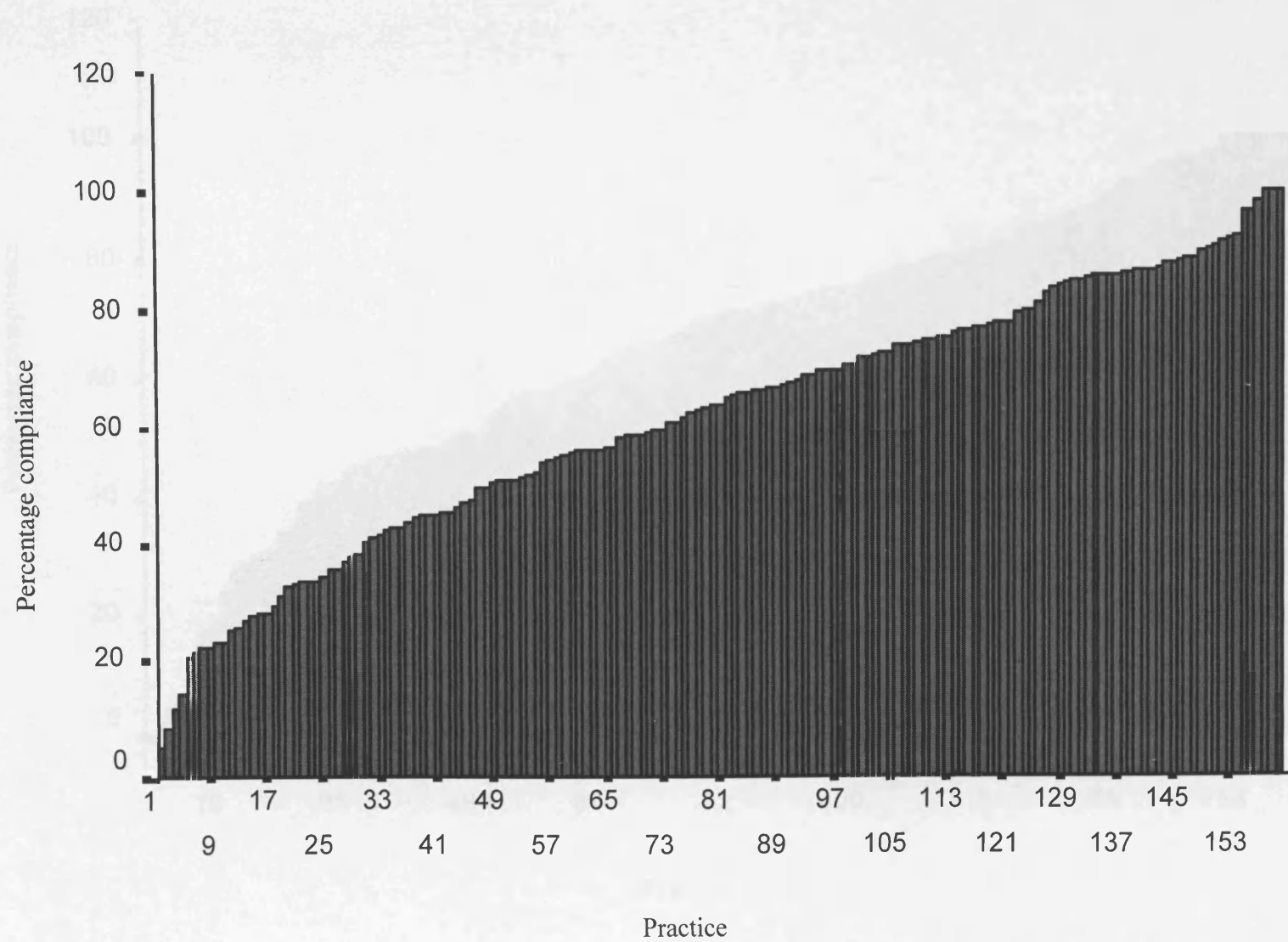
FIGURE 6.4. **Histogram showing percentage compliance with annual urinalysis**. Data are for individual practices (n=162)
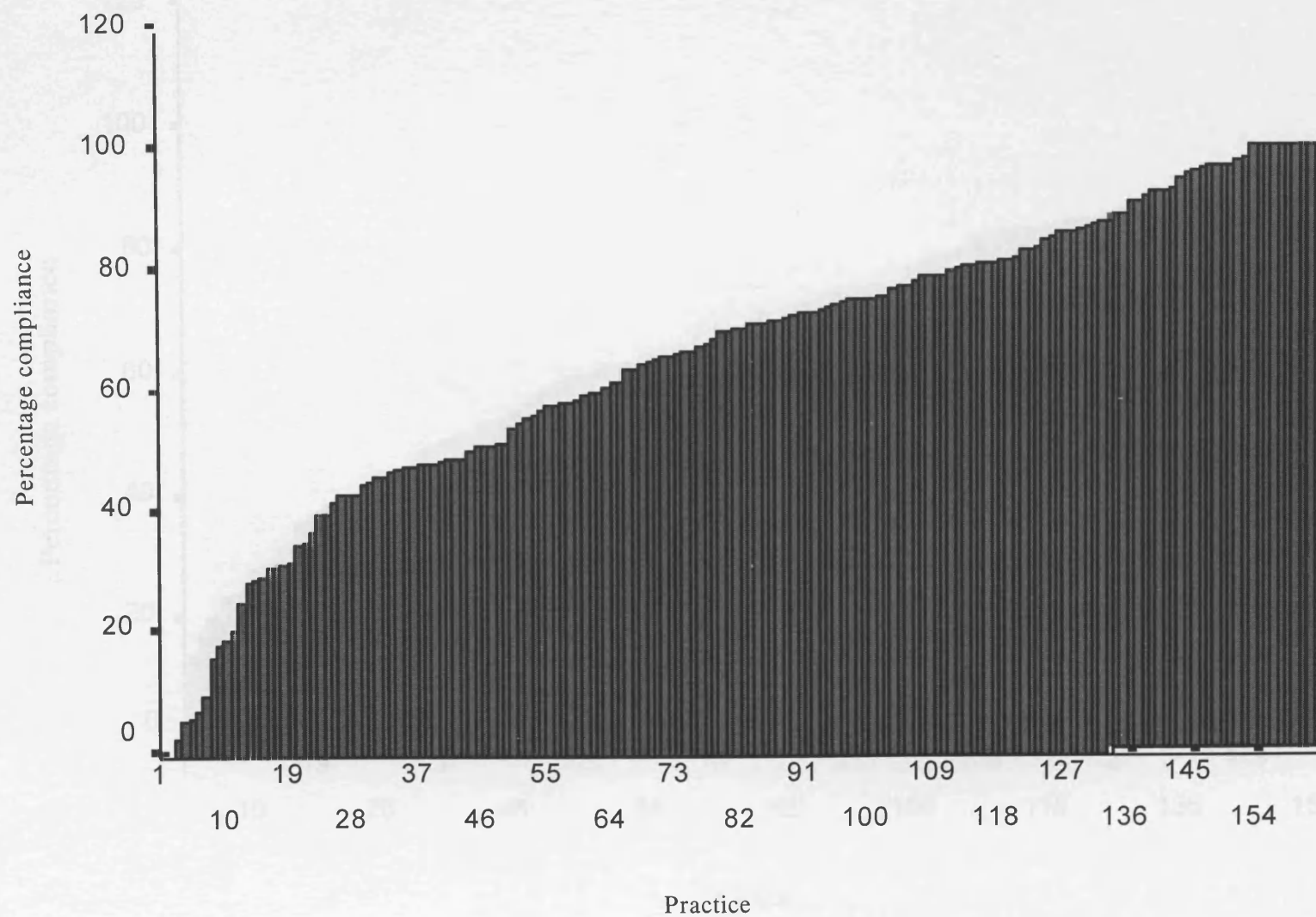
FIGURE 6.5. Histogram showing percentage compliance with annual examination of feet. Data are for individual practices (n=162)
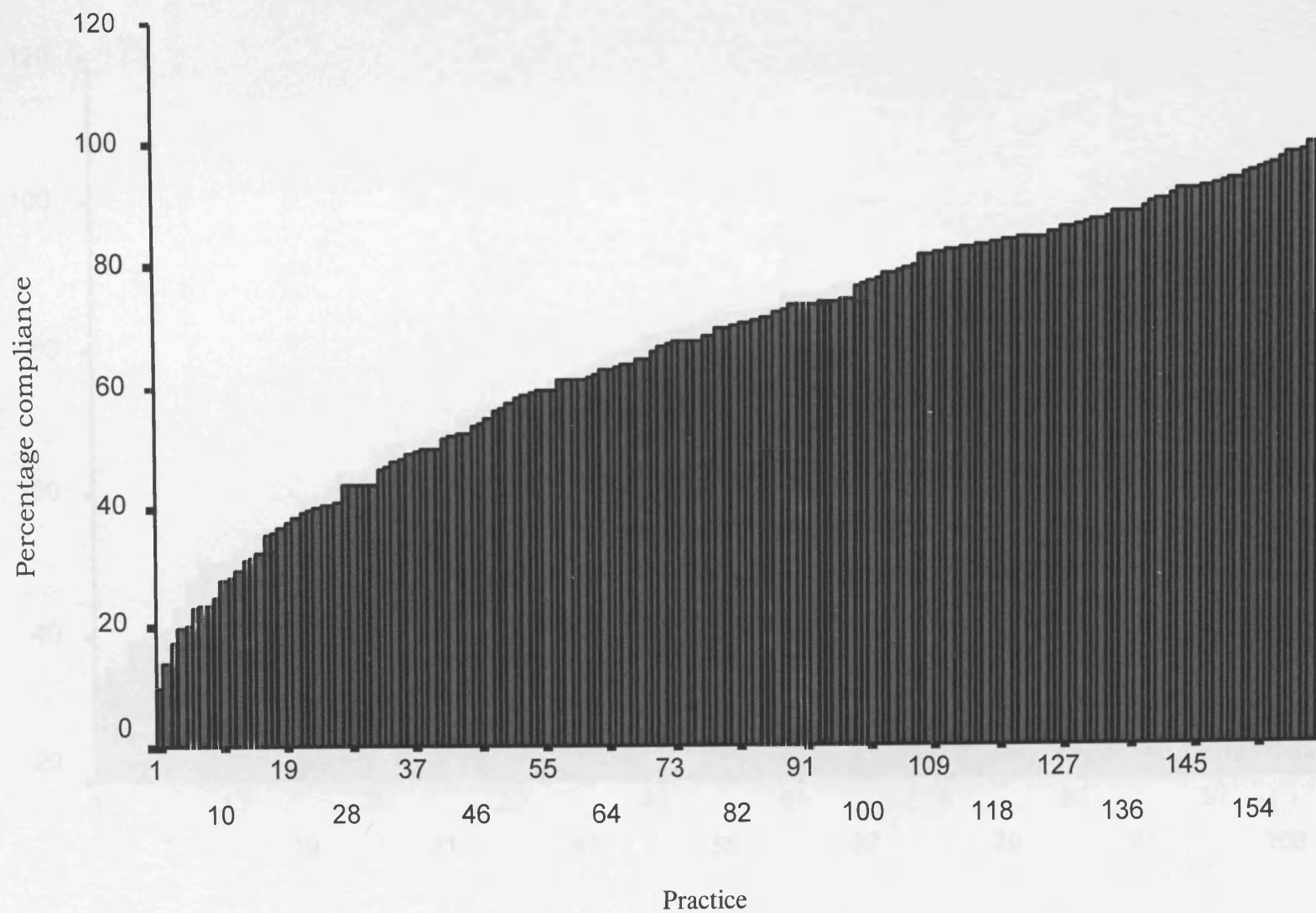
FIGURE 6.6. Histogram showing percentage compliance with annual measurement of blood pressure. Data are for individual practices (n=106)

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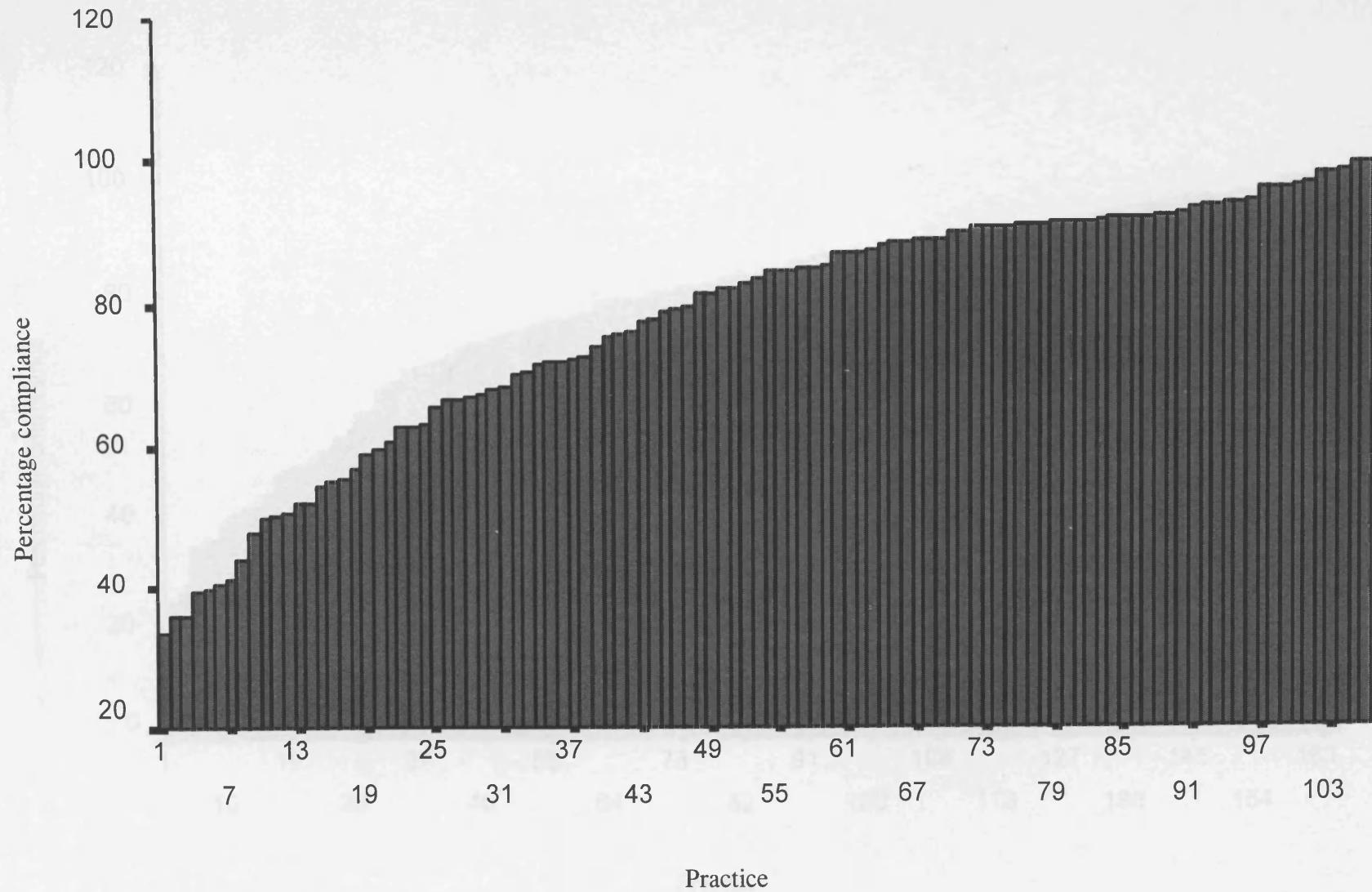
FIGURE 6.7. Histogram showing percentage compliance with annual check for glycated haemoglobin.

Data are for individual practices (n=165)
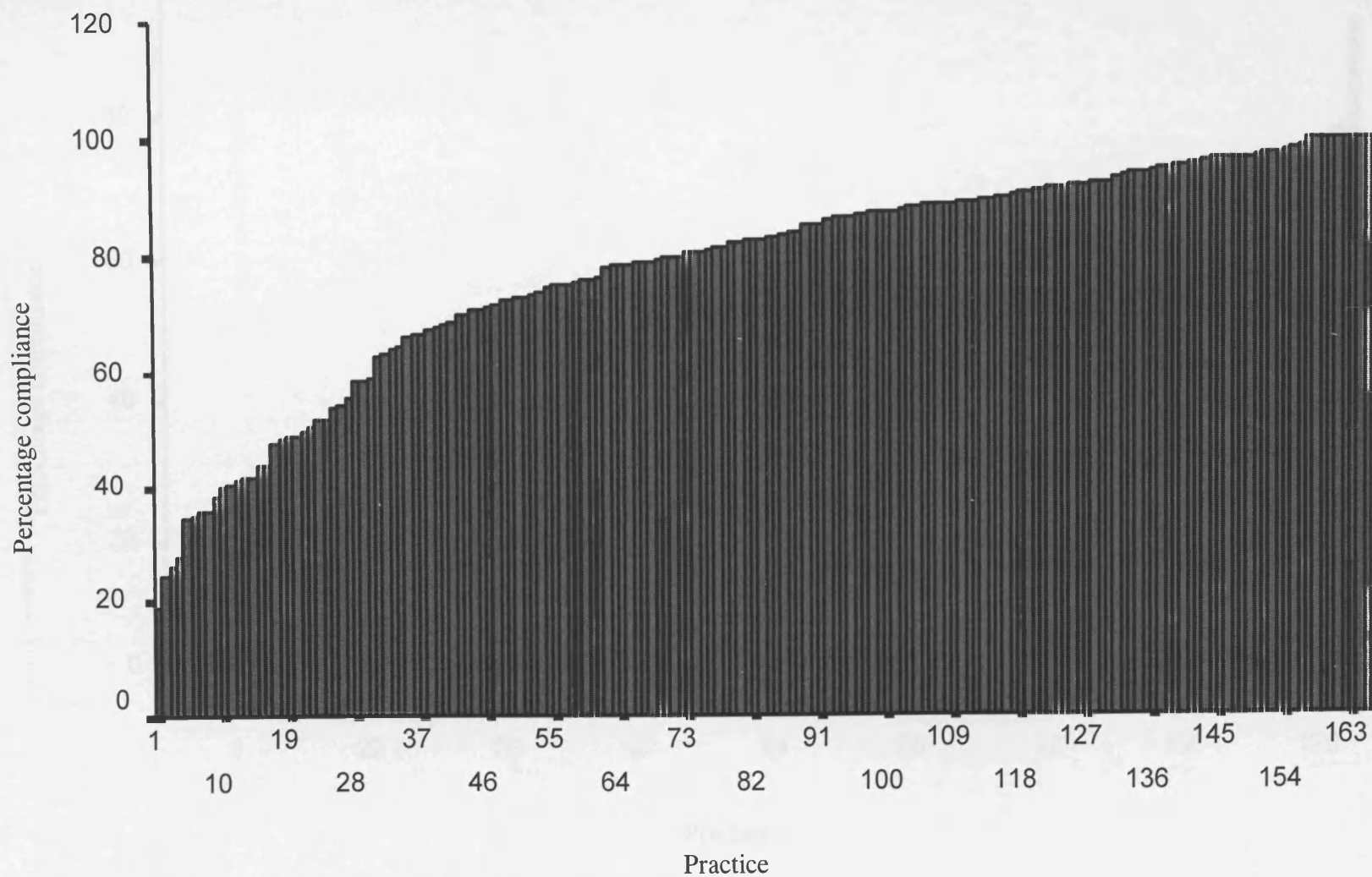
FIGURE 6.8. Histogram showing percentage compliance with glycated haemoglobin value being normal.

Data are for individual practices (n=123)
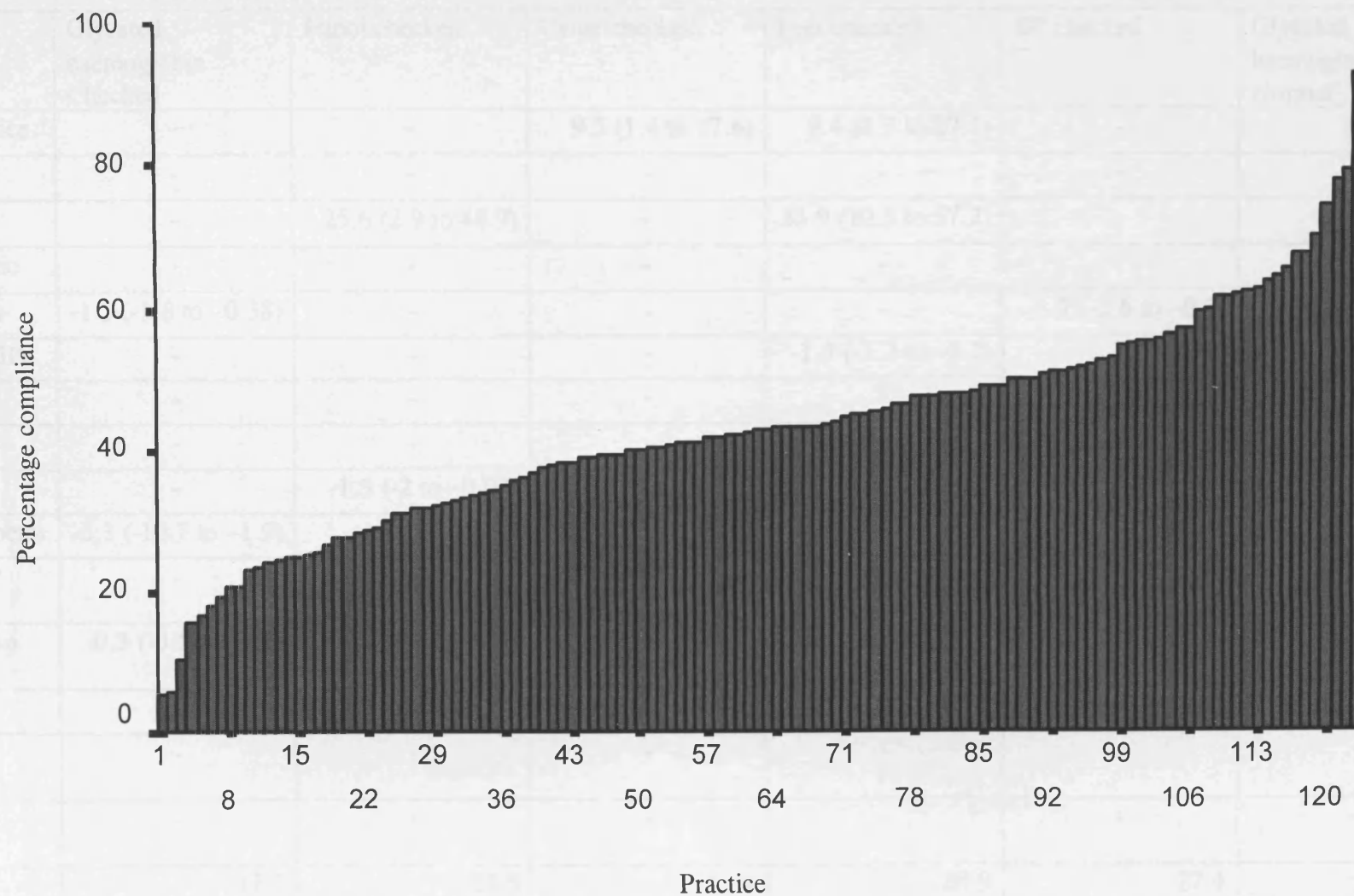
TABLE 6.7 Coefficients of estimated regression models (95% confidence intervals) for annual compliance with process and outcome of care.

	Glycated haemoglobin Checked	Fundi checked	Urine checked	Feet checked	BP checked	Glycated haemoglobin Normal[a]
Fundholding practice	-	-	9.5 (1.4 to 17.6)	9.4 (1.7 to 17.1)	-	-
Training practice	-	-	-	-	-	-
Recall system	-	25.6 (2.9 to 48.9)	-	33.9 (10.5 to 57.2)	-	-
Diabetes mini-clinic	-	-	-	-	-	-
List size in 1000's	-1.1 (-1.8 to -0.38)	-	-	-	-1.7 (-2.6 to -0.8)	-
Total number of GPs	-	-	-	-1.9 (-3.7 to -0.2)	-	-
Wte nurse	-	-	-	-	-	-
Jarman Score	-	-	-	-	-	-
Townsend Score	-	-1.3 (-2 to -0.03)	-	-2.0 (-3.3 to -0.8)	-1.2 (-2.3 to 0.0)	-
Prevalence of diabetes	-6.3 (-10.7 to -1.9)	-	-	-	-	-
Patients under GP care	-	-	-	-	-	-
Patients under hosp care	-0.3 (-0.5 to -0.2)	-0.5 (-0.7 to -0.3)	-0.5 (-0.7 to -0.3)	-0.3 (-0.5 to -0.1)	-0.4 (-0.6 to -0.2)	-0.2 (-0.4 to-.002)
Personal care[b]	-	-	-	-	-	-
GP interest in diabetes	-	-	-	-	-	-
Nurse interest in diabetes	-	-	-	-	-	-
Adjusted R^2 (%)	17.7	14.8	13.9	20.9	27.4	2.4

[a] Presence of a practice based dietician used in the model but this was not significant.

[b] Personal care defined as practice being single handed or having a personal list system.

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FIGURE 6.9. Scatter plot of % of patients who had a glycated haemoglobin checked against the % of patients who had a normal glycated haemoglobin (n=123).
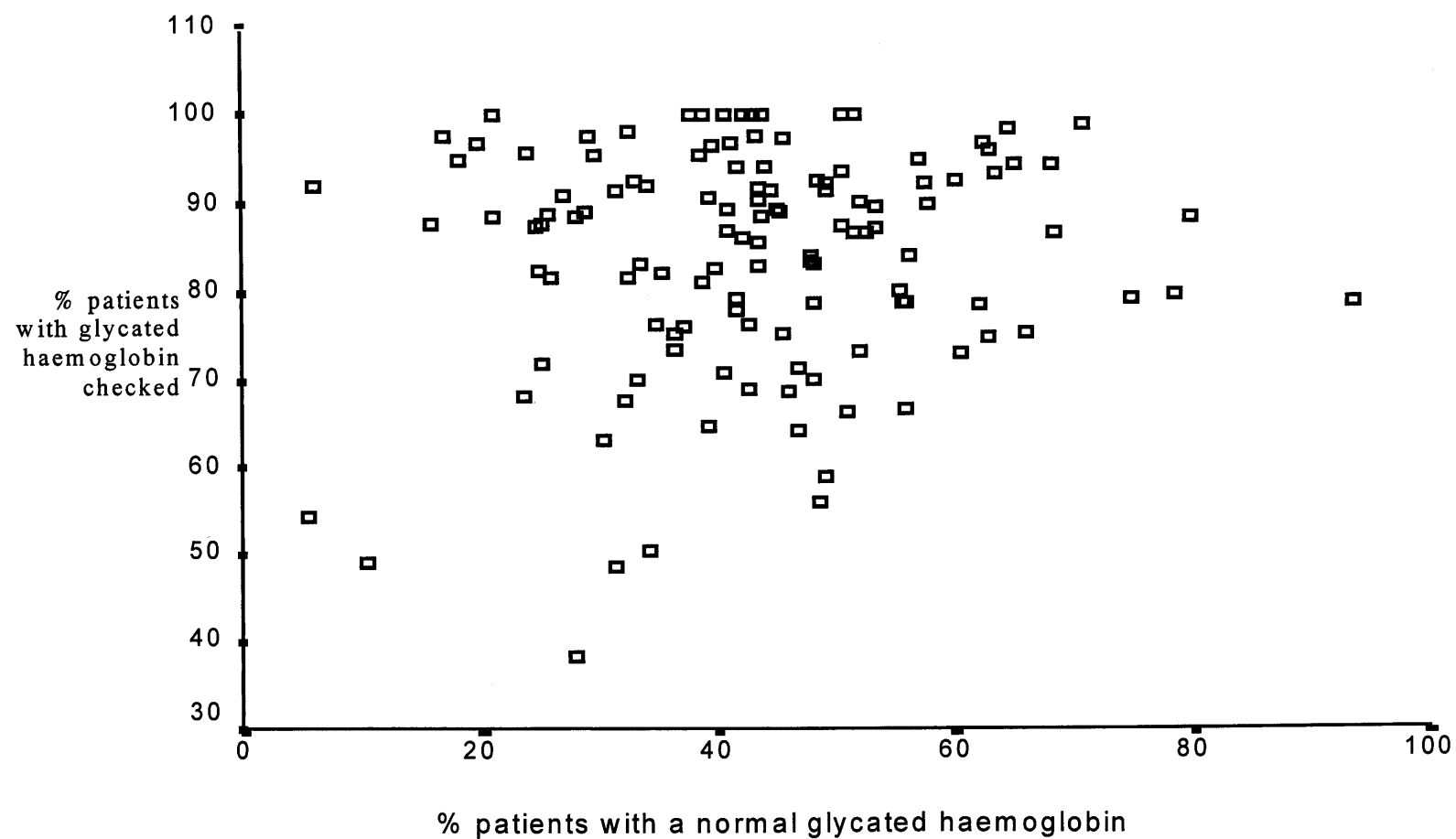
6.3.5 Discussion

This study reports on the compliance with criteria for the process and intermediate outcome of care for diabetes in 169 practices in three different geographical areas. The large number of practices from three geographical regions, unlike previous studies (Pringle et al, 1993, Dunn and Pickering, 1998), is likely to give a more complete picture of the care of people with diabetes in the UK.

Limitations of the study

Questionnaire survey

The response rate for the questionnaire survey was over 80% which is excellent for general practice questionnaires, and the responding practices were generally representative of those in the three areas. However, since the questionnaires were self-completed the responses to some questions should be interpreted with caution, for example interest in diabetes by a general practitioner or a practice nurse.

Practices Participating in Audit

Nearly all practices were approved for payment under the chronic disease management programme and were therefore involved in some form of systematic care of people with diabetes. The record review was conducted by the practices and the accuracy of data extraction has not been confirmed. However, this is normal for these types of multi-practice audits (Fraser et al, 1995; Khunti et al, 1999d). A further reservation is that the practices that took part in this multi-practice audit were self selected. Single handed practices were under-represented compared to practices in England. The sample of

practices was typical of all practices in England in terms of proportion receiving deprivation payments, training status and fundholding status (NHS Executive, 1997b).

Validity of the diabetes registers

A further reservation of this study is that the accuracy of the diabetes registers was not checked. Nevertheless, it is possible to compile a diabetes register in a district using only general practice registers (Howitt and Cheales, 1993). A combination of methods was used for case ascertainment including practice disease registers, drug registers and opportunistic identification of cases.

The data were obtained from the patients' notes and computerised records in those practices that had them. As with all notes audits, completeness depends on the quality of record keeping. Furthermore, although record reviews are widely used to evaluate quality of care, validation of the individual practice audit results was not possible in view of the study design. The validity of data is supported by the ascertainment rate of diabetes compared to other studies and the treatment and delivery of care. The prevalence of diabetes of 1.7% compares well with rates found in other recent studies (Chapter 6.1). The new health promotion arrangements for general practitioners may have encouraged efforts to improve accuracy of the practice registers. Furthermore nearly all audit groups had to use a combination of methods to identify patients for inclusion in their audits. The proportions of patients being cared for in general practice, hospital, and shared care are comparable to other studies of people with diabetes (Chapter 3.2 and Chapter 6.2).

Quality of Care

The St. Vincent Declaration initiative was established to improve outcomes of diabetes treatment and care (The St Vincent Task Force, 1995). As care is increasingly transferred from secondary to primary care, it is important to ensure that primary care is able to provide high quality care. The quality of care in this study is comparable to other similar surveys (Dunn and Pickering, 1998; Butler et al, 1997). However, these studies were carried out in single geographical regions and they usually reported very little information about the participating practices.

Despite recent evidence that complications of diabetes may be delayed or prevented (Anonymous, 1993; UKPDS 33, 1998; UKPDS 38, 1998) this study has highlighted a number of deficiencies in the provision of diabetes care, variations in care between practices and between different regions. Previous studies in single geographical areas have shown that in only 10%-15% of patients the glycated haemoglobin is within the normal range (Higgs et al, 1992; Gatling et al, 1988). The present study involving a large number of practices in three areas shows that the proportion of patients with a normal glycated haemoglobin is better but still unsatisfactorily low in primary care. However, analysis of routine audit data does not have the rigour of experimental studies such as prospective cohort studies or randomised controlled trials. Despite these qualifications, routine data allow analysis of a large number of practices which may not be possible with experimental designs.

Variations in Care

Many factors influence care and studies which investigate individual factors may fail to

show substantial effects (Pringle et al 1993), but a number of practice and patient factors were identified from the literature which were included in the analysis. The large variations between the 165 practices in compliance with measures of process and outcome of care are a concern. Dunn and Pickering (1998) showed that good practice organisation was positively associated with better process but not outcome of care, although, their study included univariant associations with a small number of practice organisational factors. Pringle and colleagues (1993) in a study of 10 practices showed that access to a hospital dietician resulted in better diabetes control. In contrast, this study shows that a practice based dietician did not result in an increase in the proportion of people with diabetes with better control.

This study found that poorer compliance with criteria for the process and outcome of care were associated with increased proportions of patients cared for in secondary care. This finding could be a result of case mix with severely ill patients being followed up in secondary care. However, the finding is also likely to be a result of poor exchange of information with process or outcome data not being conveyed to practices. Furthermore, Chapter 6.2 showed that only 20% of patients are cared for entirely by secondary care. A recent meta-analysis showed that structured diabetes care involving centralised recall systems can achieve good outcomes (Griffin, 1998). However, this study shows that having a recall system is only associated with improved annual assessment of feet and fundi but not the outcome.

In agreement with Pringle and colleagues (1993), the models used in this study explained only a small proportion of the variations in the care of patients with diabetes (as shown

by the R^2 statistics on Table 6.7). This study therefore shows that diabetes care is complex (Chapter 4.1) and variations in care are due to other unmeasured factors.

This is the first study that has addressed whether deprivation is related to variations in diabetes care. The association between deprivation and quality of care is unlikely to be due to the high morbidity. In contrast, in multivariate analysis, a higher prevalence of diabetes was negatively associated with only one process measure (proportion having an annual check for glycated haemoglobin). Recent studies have shown the existence of an inverse socioeconomical mortality gradient in people with diabetes (Chaturvedi et al, 1998; Robinson et al, 1998). This study shows that the quality of care of people with diabetes in deprived areas tends to be lower than care of people in more advantaged areas, which may help to explain the cause of this mortality gradient. Patient level data would help to confirm these finding.

Implications

This study shows that the current management of diabetes in primary care is failing to provide effective care for a large proportion of people with diabetes. Less than half the people with diabetes had good glycaemic control, which is particularly disturbing in the light of recent evidence. There are various reasons why further improvement in care of diabetes will be a major task for primary care (Khunti, 1998). Type 2 is the commonest form of diabetes and the majority of people with diabetes are now receiving their care in primary care (Goyder et al, 1998). The UKPDS showed how difficult it is to achieve tight control of blood glucose and blood pressure. Achievement of tight glycaemic and blood pressure control will place a heavy burden on already stretched primary care

diabetes teams. In addition, the increased prevalence of diabetes (Amos et al, 1997) and the possibility of adoption of the new diabetes diagnostic criteria (Alberti et al, 1998) will further increase the burden placed on primary care. Whether the current payment for chronic disease management reflects the effort required to provide high quality care is open to question. Provision of diabetes care in the UK will provide an organisational challenge (Greenhalgh, 1998) to the newly formed primary care groups, especially those in deprived areas.

CHAPTER SEVEN:

REPEAT AUDIT

7.1. The effect of audit on the quality of diabetes care

7.1.1 Introduction

Chapter 6.3 showed that despite the evidence that complications of diabetes may be delayed or prevented, there are deficiencies in the provision of diabetes care and variations in care between practices. The purpose of audit is to improve care and therefore information is needed about the extent to which multi-practice audits do lead to improvements. Chapter 2.2 showed that audit groups were feeding back information to practices on the first data collection. Chapter One showed that the majority of published multi-practice audits have only reported the first data collection (Phase 1). The literature review identified only four completed multi-practice audits with at least two data collections. These studies only reported aggregated results for all the practices within single geographical regions. There is, however, no information on features of practices that complete a second data collection. Chapter One illustrated that participation in multi-practice audit can lead to overall improvements in standards of care of people with diabetes. However, there are no previous UK studies that have shown whether participation in multi-practice audit results in improvements in care of people with diabetes within individual practices. Such information is potentially valuable for those responsible for implementing clinical governance in primary care and the diabetes NSF.

7.1.2 Aim

1. To determine features of practices that complete an audit cycle with two data collections.

2. To determine whether multi-practice audits are associated with improvements in care of people with diabetes.

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3. To determine the impact of audit on individual practices.

7.1.3 Method

The method of data collection is described in detail in Chapter Four. All practices had received individualised feedback of results of Phase 1 following which they had to conduct a second data collection (Phase 2) after implementation of change. The three audit groups left the practices to decide on the strategies for implementation of change, although all audit groups did suggest basic implementation plans.

Data analysis

Data were entered into SPSS (version 8). Associations between variables were sought using chi-squared tests for categorical variables and t-tests for continuous variables. The paired t-test was used to determine improvement in process and intermediate outcome of care for practices that had participated in both Phase 1 and Phase 2 of the audit. The proportion of practices that improved or did not improve or deteriorated was also calculated.

7.1.4 Results

Chapter 5.2 showed that 169 (51.7%) practices had taken part in a primary care audit group led multi-practice audit of diabetes: of these 81 (47.9%) practices completed only Phase 1 of the audit and 88 (55.2%) completed a full audit cycle with Phase 1 and Phase 2 after implementation of change. Table 7.1 shows the characteristics of practices that took part in Phase 1, Phase 2 and those that did not take part in audit. Significantly more fundholding practices and practices in socioeconomically affluent areas completed the

audit cycle with a second data-collection (Phase 2). Table 7.2 shows the differences in the prevalence of diabetes, and the standards achieved for process and intermediate outcome of care for Phase 1 of the audit for practices that completed and those that did not complete Phase 2 of the audit cycle. Practices that completed Phase 2 of the audit achieved higher standards of care for a number of process measures compared to those that only completed Phase 1 of the audit. These process measures were annual compliance with examination of feet, blood pressure and check for glycated haemoglobin. Table 7.3 shows the treatment of people with diabetes and the delivery of care of patients with diabetes is shown in Table 7.4. Mean compliance with the process and outcome of care in the two phases of the audit are shown in Table 7.5. There was a significant improvement for all process measures. Table 7.6 shows the compliance with criteria in Phase 1 of the audit for those practices that improved and those that did not improve or got worse following completion of the full audit cycle. An improvement in process or intermediate outcome of care ranged from 53.4% to 72.6% of practices for each of the six criteria. Practices that did not show an improvement in Phase 2 of the audit were achieving significantly higher standards of care for all process measures and intermediate outcome measure in Phase 1.

TABLE 7.1 Characteristics of practices that completed only Phase 1, Phase 2 and those that did not take part in audit.
Values are numbers (%).

	Not Undertaken Audit (n= 158)	Phase 1 Only (n=81)	Phase 1 and 2 (n=88)	All Practices (n=327)
No (%) Fundholding	51 (32.3)*	19 (23.5)	40 (45.5)*	110 (33.6)
No (%) Training	35/155 (22.6)	26 (32.1)	18/86 (20.9)	79/322 (25.4)
No (%) Computerised	142/155 (91.6)	74 (91.4)	78/86 (90.7)	294/322 (91.3)
Total GPs (SD)	3.4 (2.1)	3.7 (1.9)	3.9 (2.6)	3.6 (2.2)
Mean Wte Nurse (SD)	1.7 (1.3)	1.7 (2.5)	1.8 (1.8)	1.7 (1.8)
Mean Jarman Score (SD)	5.4 (14.7)*	3.8 (12.0)	1.0 (14.4)*	3.8 (14.1)
Mean Townsend Score (SD)	1.1 (3.2)†	0.9 (2.6)*	-0.1(3.0)*†	0.7 (3.1)
Mean List Size (1000s (SD)	6.2 (3.9)	6.8 (3.9)	7.1 (5.1)	6.7 (4.3)
Prevalence of diabetes (SD)	NA	1.8 (0.7)	1.7 (0.7)	NA

*$p<0.05$; †$p<0.00$

NA Not applicable

TABLE 7.2 Differences in the prevalence and standards achieved in process and intermediate outcome of care for the Phase 1 of the audit for those practices that completed and for those that did not complete Phase 2 of the audit

	Phase 1 only	Phase 1 and 2	p
	(n= 81)	(n=88)	
Mean Prevalence of diabetes (SD)	1.7 (0.6)	1.7 (0.7)	NS
Mean % patients with feet check (SD)	60.5 (23.8)	72.3 (18.5)	<0.001
Mean % patients with BP check (SD)	73.3 (18.3)	82.3 (15.8)	0.008
Mean % patients with urine check (SD)	62.3 (24.2)	69.2 (24.2)	NS
Mean % patients with glycated Hb check (SD)	72.2 (21.6)	82.7 (15.0)	<0.001
Mean % patients with fundi check (SD)	61.2 (23.1)	62.0 (21.0)	NS
Mean % patients with a normal glycated Hb (SD)	42.6 (15.0)	43.1 (15.2)	NS

TABLE 7.3 Number (%) of patients diet controlled, on oral hypoglycaemic drugs and insulin treated for practices that completed Phase 2 of the audit. (Complete data available for 86 practices).

	Phase 1	Phase 2
Diet controlled	2077 (22.6)	2118 (23.4)
Oral hypoglycaemic	3902 (42.4)	4199 (46.4)
Insulin treated	2416 (26.3)	2629 (29.0)
Not known	800 (8.7)	112 (1.2)
Total	**9195 (100)**	**9058 (100)**

TABLE 7.4 Number (%) of patients under GP care, hospital care and shared care for practices that completed Phase 2 of the audit. (Complete data available for 80 practices.)

	Phase 1	Phase 2
GP Care	4769 (56.5)	5014 (60.6)
Hospital Care	883 (10.5)	1135 (13.7)
Shared Care	1835 (21.7)	1842 (22.3)
Not Known	958 (11.3)	277 (3.4)
Total	8445 (100)	8268 (100)

TABLE 7.5 Mean annual compliance with criteria for the process and intermediate outcome of care in Phase 1 and 2 of the audit for those practices completing both phases. Figures are percentages unless otherwise stated.

	No. of Practices	Phase 1 (n=9547)	Phase 2 (n=9408)	Difference (95% CI)	P Value (two tailed)
Feet checked	88	72.3 (18.5)	77.2 (17.7)	4.9 (1.7 to 8.1)	0.003
Urine checked	88	66.5 (25.7)	72.3 (22.0)	5.8 (0.7 to 11.0)	0.028
Glycated haemoglobin checked	88	82.7 (15.0)	86.0 (12.9)	3.3 (1.4 to 5.1)	0.001
BP checked	50[a]	75.8 (19.9)	85.5 (15.1)	9.6 (4.4 to 14.8)	<0.0001
Fundi checked	84[b]	62.2 (21.0)	70.3 (18.1)	8.0 (4.9 to 11.2)	<0.0001
Glycated haemoglobin normal	81[c]	43.1 (15.3)	46.2 (14.7)	3.2 (0.3 to 6.1)	0.33

[a] Phase 1 (n=6050) and Phase 2 (n=5460)

[b] Phase 1 (n=9271), Phase 2 (n=9097)

[c] Phase 1 (n=8445), Phase 2 (n=8268)

showed deterioration following the completion of the full audit cycle. Figures are numbers (%)

	Practices that showed improvements		Practices that showed no improvements or showed deterioration		
	Number of Practices (%)	Median Phase 1 compliance (IQ range)	Number of practices (%)	Median Phase 1 compliance (IQ range)	p[t]
Feet checked	54 (61.4)	65.3 (53.3 to 83.4)	34 (38.6)	83.3 (73.3 to 92.9)	<0.0001
BP checked	27 (55.1)	82.5 (65.9 to 88.9)	23 (34.9)	92.4 (90.3 to 95.1)	<0.0001
Urine checked	47 (53.4)	64.7 (45.9 to 76.2)	41 (46.6)	82.5 (74.6 to 96.5)	<0.0001
Glycated haemoglobin checked	55 (62.5)	78.4 (73.0 to 88.5)	33 (37.5)	89.9 (87.3 to 98.2)	<0.0001
Fundi checked	61 (72.6)	56.7 (44.2 to 71.2)	23 (27.4)	81.0 (71.9 to 58.8)	<0.0001
Glycated haemoglobin normal	48 (60.0)	40.9 (26.3 to 48.5)	32 (40.0)	48.0 (40.6 to 56.3)	0.001

[t] Mann-Whitney test between compliance in Phase 1 of practices that improved to practices that did not improve or deteriorated

7.1.5 Discussion

Although a lot of information is available about the proportion of practice taking part in audit, there is less information about the impact on the quality of care. This is one of the largest UK studies which shows that multi-practice audit with peer comparison feedback is associated with improvement in quality of care. However, only half the practices participated in the audit, of which half completed the full audit cycle. The new White Paper requires wide spread introduction of clinical governance and clinical effectiveness programmes which will incorporate clinical audit (Secretary of State for Health, 1998). This study therefore suggests that implementation of audit programmes will be an organisational challenge for those responsible for implementing quality assurance programmes in primary care.

This study has highlighted some aspects where audit can be used as a tool for quality improvement. All practices did not show improvements and there were wide variations in the magnitude of improvements despite the broader approach to quality improvement. Practices that completed the audit cycle were already achieving significantly higher standards of care than those practices that did not complete phase 2 of the audit. Therefore the potential for improvement is already low. Despite this limitation, there were improvements in standards of care. However, it is not possible from this study to show whether these were due to better performance or simply improved recording. This study failed to demonstrate improvement in intermediate outcomes of care. However, improvements in outcomes are unlikely to be apparent within the time period of the audit with improvement of outcome needing longer to become apparent.

The study shows that audit may not be an effective tool for all practices and other strategies will need to be used to produce improvement in care. Many practices showed no improvement or deterioration in performance despite effort in participating in and completing the audit cycle. These were practices that achieved high initial (Phase 1) standards of care (70-90% compliance with process criteria). It can be argued that care of people with diabetes in these practices is acceptable and aiming for higher standards may be unrealistic. It may therefore be more appropriate for these practices to concentrate their audit activities in other clinical topics or outcome criteria without religious completion of the audit cycle

The large number of practices that participated in multi-practice audit shows the success of such programmes in improving care of people with diabetes. The review in Chapter One demonstrated large improvement in diabetes care in unselected populations in single health districts as a result of multi-practice audits. However, these studies fail to give any details about practices that participated in the program. The result of this study show that there are improvements in care. These improvements are unlikely to be due to secular trends for three reasons. Firstly, the improvements observed during the period of study were large. Secondly, previous audits have consistently shown poor compliance with process and outcomes of care. Thirdly, practices already achieving high standards of care did not show improvements.

If audit is to be used as a tool for quality improvement, widespread uptake of it within PCGs will be required. This study has highlighted some features of practices that are more likely to complete the audit cycle by conducting a second data collection. These

practices were fundholding practices and practices in socioeconomically affluent areas. Chapter 5.2 showed that larger practices and more developed practices are more likely to undertake the first data collection. One recent study of multi-practice audits of diabetes showed that practices in socioeconomically deprived areas, non-training practices and practices with a higher prevalence of diabetes were associated with slower completion time of a multi-practice audit (Barklie and Stevenson, 1999). Indeed, practice staff felt they struggled to complete data collection on schedule because of the amount of work required for audit and the lack of time available. Resource issues affect some practices' ability to complete an audit cycle and there are organisational barriers which will need addressing by improved facilitation.

Limitations

There are several potential limitations to this study. Firstly, the data like most audit studies are self-reported. Secondly, it is not possible from this study to show whether the improvements were due to better performance or improved recording. There were significantly more fundholding practices and practices from less socio-economically deprived areas that completed the two phases of the audit. Chapter 6.3 discussed limitations of audit data and validity of this type of data in this study.

Implications of the study

The challenges described in the St Vincent Joint Task Force Report include reduction in long term complications of diabetes (St. Vincent Task Force for Diabetes, 1995). *Our Healthier Nation* outlines the governments new health strategy for England with the aim of improving health and reducing inequalities (Secretary of State for Health, 1998).

Feedback to provide use of data on performance can be a powerful stimulus for quality improvement (Thompson et al, 1997). The finding from the single topic multi-practice audit organised by primary care audit groups confirm previous findings that such audits can encourage a large number of general practitioners to participate and bring about changes in behaviour, resulting in improvements in standards of care (Fraser et al, 1995). The St Vincent Declaration Action Programme also suggests that one mechanism for improving quality is anonymous comparison of indicators of process and outcome from different centres and practices (bench marking). Despite wide spread enthusiasm for audit there are few data demonstrating the effectiveness of audit in improving outcomes in primary care. The baseline process and outcome measures in this study are similar to those reported from other primary care studies (Chapter One). The interventions following audit in the practices were not standardised and are individual to the practice. Nevertheless several of the strategies developed by audit groups may be applicable to other primary care chronic diseases.

It is likely that to achieve improvements in care, audit needs to be supplemented with a range of other supportive interventions such as feedback, organisational change and patient involvement. This supports the case for audit being part of wider "clinical governance". In choosing an implementation strategy, it is important to consider how care for the condition is organised and what factors may prevent compliance with recommendations based on evidence (Khunti and Lakhani, 1998). There may be obstacles such as those related to individual practitioners (knowledge, skills, attitudes, habits), to the social context of care provision (reactions of patients, colleagues, authorities), or to the organisational context (available resources, organisational climate,

structures, etc) (Palmer R et al, 1985). Changing the clinical practice of GPs may be more successful if the implementation strategy is chosen to fit the clinical setting and circumstances (Robertson et al, 1996; Grol, 1997). A study by Baker and colleagues (1997) identified a wide variety of obstacles to implementation of guidelines for care of depression in primary care and they suggest that use of several strategies is more likely to overcome such obstacles to change.

The results of this study will be valuable for clinical governors who will be using audit to monitor and improve performance within their primary care groups. Future studies need to monitor the impact of audit programmes on outcome over time.

CHAPTER EIGHT:

DISCUSSION AND ISSUES FOR FUTURE RESEARCH

8.1. Introduction

A series of studies in this thesis have been described that show that collation of audit data is feasible and can be used to determine prevalence, delivery and quality of care, and support the implementation of quality assurance programmes. In this thesis diabetes was used as an exemplar, however, other conditions could be used for collation of audit data. The studies also show that linking audit data with other sources of data can be used as a method for investigating factors associated with variations in prevalence and quality of care. This method of collation has not been published previously and has potential for other conditions in primary care. In this chapter the overall implications of this thesis in terms of potential uses of collated audit data are discussed. The chapter also discusses whether such collation is possible, and highlights some of the practical difficulties that may be encountered. Prior to discussing the implications of this work for the future, I would like to present a summary of the studies reported in this thesis:

- Collation of evidence-based audit data from a large number of practices can provide information on performance of clinical conditions and show variations between practices and between different health regions

- Information about the levels of performance in a large number of practices may have a role in improving care

- Evidence-based criteria would help ensure uniformity of data definitions and facilitate comparison over time

- Linking audit data with routine practice level data can be used to determine which practices are associated with delivering good quality care

- Collation of audit data would also allow monitoring of improvements in care as a result of audit or by implementation of other strategies.

- Collation of audit data would allow estimations of prevalence and treatment of many clinical conditions

- There are wide variations in criteria chosen for audits both in primary care. Many of the criteria are not based on evidence and therefore may not have an impact on outcome.

- Organisations involved in audit are not recording or coding data in a consistent format and therefore making it difficult to collate and compare data

- Organisations are reluctant to provide and share the primary data even in an anonymised format

- The study also highlights the deficiencies in care and wide variations in care in different parts of the country

The new NHS has at its core quality and development of primary care, both of which will be driven ultimately by primary care groups through the use of explicit quality standards. This chapter discusses these potential uses in light of the recent introduction of The National Institute for Clinical Excellence (NICE), clinical governance and the new NHS Information Strategy.

The Governments' *Information for Health* strategy maps the routes towards helping patients receive the best care (NHS Executive, 1998). This strategy will deliver communication to extended clinical teams and across organisational boundaries. Health care providers will be able to share personal performance data themselves and with the public. Identifying the needs and measuring the health of different local communities to support provision of more effective healthcare is an important part of the public health function (Burns, 1998). *Information for Health* sets out a strategy for making more effective use of information and

information technology in the NHS to support better care and improve population health. The new information strategy for the NHS calls for all computerised practices to be connected to the NHS network by the end of 1999. Information used for clinical governance and NHS planning will finally be reliable and complete, as it will be retrieved from data generated during patient care (Wyatt and Keen, 1998a).

The source of most information about the current health of the population is contained in GP records. Aggregated data from primary care information systems will provide useful data on the health of the population. Access to this level of information will allow analysis of comparative performance at practice, primary care group and health authority levels as a mean of identifying and targeting unmet needs. Local organisations including primary care groups, health authorities, NHS Trusts and social services organisations will be able to use this information to develop local plans for implementing national strategy.

Chapter One and Chapter 2.2 outlined the considerable proliferation of audit projects since its widespread introduction in primary care. The Audit Commission urged the NHS to revise its information systems to improving clinical effectiveness in 1995 (Audit Commission, 1995). NICE will produce national guidelines and clinical governance will provide the mechanism for local implementation. Audit will be a principal component of clinical governance. However, Chapter 2.2 highlighted that different organisations are using varying audit criteria, data recording and collection, and using different methods of classifying their findings. This raises questions about whether audit is yet sufficiently well

developed to meet the demands of clinical governance.

8.2 Potential uses of collated audit data

Much effort and money has already been used in the introduction of audit within the NHS, although there is a need for further research into methods to improve the effectiveness of audit (Barton et al, 1995). General practice has a wealth of data that could be used for purposes such as assessing health needs, planning and audit (Smith et al, 1995) and there are many advantages of using this type of routine audit data (McKee, 1993). The two key advantages are cost and the size of data aggregated. Because data have already been collected, the additional cost would only be for collation and analysis. A large numbers of patients would be included and therefore the findings would be more representative of the population.

Audit will have a key role within the clinical governance framework and collation of the vast amount of audit data will become available within PCGs. Therefore audit data could be used to monitor the quality of care in the NHS and to allow comparisons of performance between districts or organisations such as PCGs. Chapters Three and Chapter Six illustrated that they could potentially produce large databases of specific information which might be used for longitudinal examination of prevalence rates and estimates of trends (Khunti et al, 1999c). There could also be potential use for examination of cost and access; for study of adverse events and patient-specific outcomes; and as a sampling frame for subsequent primary data collection (Paul and Kalasinski, 1994). Collation of audit data may have a number of benefits (Box 8.1).

Box 8.1. Potential uses of aggregated audit data

STRUCTURE OF CARE
- Service provision within primary/secondary care
- Organisational aspects of care
- Morbidity/mortality data

PROCESS OF CARE
- Important for structured care
- Aids individual target setting
- Facilitates delivery of care
- Method of standard setting
- Local and national performance comparisons

OUTCOME OF CARE
- Data on outcome of interventions
- For local or national target setting
- Support for audit processes
- Supports decisions of local practitioners
- Supports shared care
- Effectiveness of implementation strategies

EDUCATION AND RESEARCH
- Aid understanding of the clinical condition
- For prevalence rates and estimates of trends
- Future guideline development

CONTRACTING AND ADMINISTRATION
- Examination of costs and access issues
- Clinical information for purchasing and providing bodies
- As a method of measuring performance indicators
- Provides information on
  - own activity
  - comparisons to local or national activity
  - use of specialist service
- Health needs assessment and health care planning at national level with regard to specific groups:
  - Ethnic
  - Elderly
  - geographic basis of local guidelines

- Development of local guidelines

8.2.1 Assessing quality of care

Methods for standard setting are well established in some countries (Grol, 1990). There is a need for a method of standard setting in this country and Chapters Three and Six showed that collation of audit data may provide a way for the development of rational regional or national standards (Khunti et al, 1999b). Once results of individual audits are collected in a database, average performance can be compared for individual organisations or all health care organisations locally and nationally. They could potentially be very useful for those involved in implementation of the NSF for diabetes. Comparing audit results between providers would also be possible. In the USA, Healthcare Knowledge Resources is focused on providing clinical comparative data to assist healthcare providers in improving the quality of care. These reports are used to identify areas of excellent quality and those needing improvement and, to assist hospitals to distribute resources more appropriately (Rontal et al, 1991).

Collation of data from interface audits would allow comparisons of standards between primary and secondary care. This could be achieved by "record linkage" in which medical information is collected from separate sources relating to individual patients identified by name and date of birth (Wald et al, 1994). Work is already being carried out to produce a United Kingdom Diabetes Dataset which is intended to become the national standard for exchanging data about diabetes, equally applicable to primary and secondary health care sectors (Vaughn,1995). This thesis has shown that collation of audit data using evidence-

based review criteria will identify the proportion of patients being managed according to evidence-based guidelines. Evidence-based review criteria will allow the development of databases which could be used for outcomes research. The studies in this thesis show that collation of audit data would also allow comparisons between various other groups, for example between deprived and ethnic populations and different types of practices. Systematic, collaborative collection and analysis of data would allow the creation of precise guidelines (or protocols) with a structured, logical approach to a closely specified clinical problem, employing only appropriate reproducible data from each case (Jenkins, 1991).

An important component of quality assurance is the analysis of peer group comparisons (Howanitz et al, 1992). In the new NHS, PCGs will need to share information between practices and with other organisations. Practices can already carry out comparative analysis within their own regions, but collation of national audit data would allow comparisons of individual or local performance with national standards. This would identify inappropriate variations and potential for improvement. Collation of audit data can be used to determine variations in patterns of care for various conditions and procedures. Large variations in diagnosis, treatment and outcome would indicate that a guideline needs to be developed for this topic (Edinger and McCormick, 1996). The Leicestershire multi-practice audit data were used to develop the Leicestershire Evidence Based Guideline (Leicestershire Health Authority, 1998). The audit data allowed prioritisation of a limited number of evidence based recommendations where the local standards required improving.

8.2.2 Improving quality of care

Other methods are being developed for the evaluation of health outcomes in non-experimental settings. For example, in the USA, Medicare claims databases have been used for evaluating medical effectiveness by Patient Outcomes Research Teams (PORTs) supported by the Agency for Health care Policy and Research (Mitchell et al, 1994). A second example is a system of surgical audit - the National Confidential Enquiry into Preoperative Deaths (NCEPOD) which was introduced throughout the United Kingdom in 1989 (Buck et al, 1987). Chapter Seven showed that multi-practice audit with peer comparison feedback leads to improvement in quality of care. However, there are clear differences in practices that improve and those that do not improve as a result of audit.

As in traditional meta-analysis, collated audit data may assess consistency among audits and also the improvements in performance using different interventions (Boissel et al, 1989). The development of information systems and effective mechanisms for audit may provide a continuous cycle of improvement with a resultant increase in standards of care. They may also identify types of programmes that are more successful in creating change. This would allow the assessment of appropriateness and effectiveness of various implementation strategies and methods of feedback.

8.2.3 Performance Indicators

Performance rates may identify local clinical weaknesses, and resources could then be directed to these areas to restore equity. Audit may be able to provide data for performance indicators. The NHS Executive and Department of health have proposed a wide range of

performance indicators (Secretary of State for Health, 1998). Authors have argued that performance indicators could potentially be used to reflect competence and performance of doctors, as a management tool and for reaccredidation, (Majeed and Voss, 1995a; Majeed et al, 1995b). Performance indicators can be used to identify how the practices deviate from local or national norms and where scope for further investigation and audit may exist. Comparative population based indicators of health outcome may also have an important part in assessing the performance of purchasers and providers of health care (McColl et al, 1998).

8.2.4 Process and outcome of care

Data on process and outcomes of care will be possible including the organisational or administrative aspects of care. This method will also identify process measures of quality that will be linked with outcome measures and therefore allow the evaluation of effectiveness of clinical care. Chapter 6.3 showed that improved process of care for diabetes (proportion of people with diabetes having an annual check for glycated haemoglobin) was not associated with improved intermediate outcomes (the proportion of patients with a normal glycated haemoglobin).

8.2.5 To aid purchasing and commissioning

These databases may allow clinical information for purchasing and providing bodies. The increasing role of primary care purchasing, in particular, locality based commissioning of health services requires assessment of local needs (NHS Management Executive, 1994).

These data could be helpful in the development of Health Improvement Programmes, clinical governance and epidemiological research.

8.3 Validity of audit data

For collation of audit data to be useful, the data must be complete and accurate. Chapter 2.2 identified problems in primary care audits including methods used for sampling procedures and data collection procedures. Much observation in practice is determined by record review. Unreliable and poorly focused medical records in general practice have serious implications for the usefulness of notes for audit (Mant and Phillips, 1986; Webb et al, 1991). However, routine information systems can be complete and accurate in primary care (Pringle et al, 1995). Regional and national databases of routinely collected data contain large quantities of health information, usually covering whole populations and often spanning prolonged time periods (Bain et al, 1997). However, routine information should not be used without some prior assessment of its accuracy. Completeness and accuracy of data capture can be improved by providing feedback to users on the use of the system and performance (Barrie and Marsh, 1992), and validation procedures can ensure that data are of high quality (Pearson et al, 1996). However, use of such patient-based information is currently difficult because of lack of tools available for collecting consistent data and aggregating them.

8.3.1 Information Technology

Manual data retrieval can be costly and time consuming (Wyatt and Wright, 1998b). Increasing quantities of data are being collected in primary care and are being held electronically. Advantages of computer-based records over paper based records include easy access, legibility, data safety and continuous data processing (Powsner et al, 1998). The case with which these data can be retrieved and ways in which they can be interpreted and validated are of great importance (Neal et al, 1996). Other potential methods of data collection using electronic systems are being explored. One system, the Morbidity Information Query and Export Syntax (MIQUEST) software has been found to be a useful tool in retrieving electronic data (The Clinical Information Consultancy, 1995).

Standards for good information systems have been set by the National Information Management and Technology (IM&T) strategy which recommends that all information systems should allow information to be derived in a person-based integrated, secure and confidential fashion (The National IM&T Strategy, 1997). Clinical systems should also comply with professional standards being set for computer-based patient records (Dick and Gabler, 1995). The white paper has proposed a new NHS information superhighway with a commitment to modernising clinical information systems with the emphasis that NHS organisations focus on clinical accountability (Secretary of State for Health, 1997).

Meticulous data collection and management are crucial to collation and interpretation of collated audit data. Electronic patient records are a key component to quality improvement

and data elements needed for quality assurance need to be embedded in patients' records. There need to be ways of excluding and collating the subsets of data needed for quality monitoring both locally, regionally, nationally and possibly internationally. For example excluding patients monitored in secondary care or within certain age groups. The key issue is construction and maintenance of confidential registers of patients and implementation of quality assurance measures at point of delivery of care. Once installed the data will need validating, maintaining and will require monitoring.

Issues regarding confidentiality of data need to be addressed before audit data can be collated. For consent to be informed, the NHS Executive clearly stipulates that "patients should be made aware of existence and purpose of register" (NHS Executive, 1996c).

8.4 Methodology for collating audit data

There are a number of important difficulties that must be addressed before the findings of audits of the same topic undertaken in different localities could be compared in a systematic manner. Collation of audit data will involve analysis, evaluation and synthesis of results from various audits. A systematic approach will therefore be required to avoid errors in drawing conclusions. Many audits that have been undertaken have major methodological flaws, and strict assessment of quality would be required before an audit could be considered for inclusion in a review. The methods applied for systematic overviews (Oxman, 1994) could be modified for multi-audit analysis. Explicit reporting of the methods used will be required to maintain the validity of the results.

The methodology used for collating audit data can be similar to those used for traditional reviews. In a review a question must be posed, a target population of information sources identified and assessed, appropriate unbiased information obtained from that population and conclusions derived. Often statistical analysis (meta-analysis) can help in reaching conclusions (Oxman, 1994). The steps to follow in collating audit data would include: posing a question; identifying the audits; selection for audits for inclusion; data extraction; and summarising the results and drawing conclusions.

8.4.1 Question to be posed

Collation of audit analysis should clearly state the audit review criteria that need to be addressed. This should be appropriate to a particular aspect of patient care. The question to be asked should be made clear and it should be focused rather then broad and ill-defined. Conventional systematic reviews answer very focused questions while collation of audit analysis may include many review criteria forming a protocol and may address one or a number of review criteria (Fraser et al, 1997). Collation of audits may address the management of patients with heart failure or it may address one important specific audit review criterion, for example "patients with left ventricular systolic dysfunction have been commenced on an angiotensin converting enzyme inhibitor" (Khunti et al, 1997)

Focused review articles do not always consider all the outcomes. In a similar way collation of audit data should be limited to a very few criteria. The review criteria for audit analysis must always be evidence-based as these have impact on outcome (Fraser et al, 1997). Good

audit analysis will provide recommendations for what should be done for a particular group of patients and they will determine what proportion of patients have received the recommended care.

8.4.2 Selection of audits for inclusion

The audits will come from a variety of sources covering a variety of patients. The authors should be explicit in reporting how they located all the relevant audits. Flawed audits or audits that are systematically different should not be included. The readers need to be assured that all important audits have been included and the results should be reported in sufficient detail so that readers are able to critically assess the basis for the author's conclusions. The review criteria should, therefore, be very precise if the results of these audits are to be applied generally. Appropriate methods need to be used to select the audit criteria for inclusion in the analysis and the criteria used to select studies for the inclusion should be consistent with the focus (Oxman, 1994). Critical evaluation and synthesis of this information will separate the insignificant and unsound audits. The criteria should specify the clinical condition, review criteria examined, the selection of patients and whether random samples were selected in the audits. A difference in patient inclusion criteria may lead to different results among collated audit analysis addressing the same clinical topic. Selected practices will take part in audits and the results may be biased. Therefore there should be transparency about the type of practices and patients used in the final results of the audit analysis.

Comparable data also need to be gathered and exchanged in a form which can be usefully analysed. There is, therefore, a need for approaches that can provide replicable and reliable results. Different data collectors can obtain different values (Wyatt, 1995). The original clinical data may have been collected from clinical records by different doctors using differing definitions and methods of collection. Other issues include the completeness of data written in notes (Romm and Puttham, 1981) and missing notes. To improve data recording the most common strategy is to use specially designed forms or computerised "audit systems" (Wyatt , 1995). It has been suggested that audit systems should be subject to an external quality assurance scheme to assure data quality (Charlton and Cunninghame, 1992).

Chapter One illustrated that many audit groups (formally known as medical audit advisory groups) are already using set protocols which contain prioritised evidence-based review criteria. Moreover, the number and range of multi-practice audits being promoted by audit groups is considerable. The most common topics include diabetes, asthma, hypertension, coronary heart disease risk factors, epilepsy, benzodiazepine prescribing and other prescribing topics. However, Chapter 2.2 showed that audit groups have generally not used a standardised method of data collection about the level of practice audit or a standard method of grading or judging audits (Khunti et al, 1999b).

As in systematic reviews of RCTs, there will be extensive clinical heterogeneity in audits (Thompson, 1994). It is therefore important that sources of heterogeneity are avoided. There

may be methodological differences in selection of patients. Furthermore, the review criteria selected must be very precise and must be measured similar endpoints. Statistical heterogeneity may be caused by defects of methodological quality, for example, selection of patients for the individual audits.

As in conventional systematic overviews, a checklist could be used to evaluate the quality of the audits (Box 8.2). A stringent checklist will allow identification of criteria for inclusion and exclusion of the audits and will thus avoid any bias.

A check list may include the review criteria used and whether they were evidence-based, the patient groups included in the audit, the data collection and sampling methods used. Unless a process of selection is carried out systematically for assessment for quality and validity, bias will develop and it will leave the review open to question. It is important to know that the audit criteria included for the audit analysis are of a good quality. Differences in the way the audits were carried out may result in important differences between the audits. Authors will come to correct conclusions only when the audits for inclusion are accurately assessed for validity. Issues such as which data are to be used for the review will need to be made explicit, for example, to use the first set of data collected or to use the data from the second data collection.

BOX 8.2 A checklist of questions to be resolved before aggregated data from different audits

Question topic posed:	Precise and evidence-based
Identification of audits	Methods for identification of audits are clearly stated
Selection of audits for inclusion:	Do the audits address the question to be posed
	Is the target population in the audits clearly stated
	Were random and representative samples used in the audits
Data extraction and synthesis:	Are data used for the synthesis clearly stated (e.g. data from the first cycle or repeat cycle)
	Is the aggregation for single patient data or group data
	Were variation between results of audits analysed
	Were originators contacted for verification of data
	How were errors in data extraction overcome
	Are conclusions supported by the data synthesis
Conclusions:	
	How is confidentiality of data providers to be retained
Practical issue:	
	How are the results going to be published or fed back to the originators

The assessment of audits are subject to both mistakes (random errors) and bias (systematic errors). Two or more people participating in the review should guard against these errors. To avoid bias, the decision to include the audit should be made by looking only at its method and not its results. Use of appropriate checklists will also help to overcome any bias.

8.4.3 Data extraction

Meta-analysis using individual patient data are described as a yardstick against which other forms of systematic reviews could be measured (Chalmers, 1993). The individual patient data allow careful data checking and standard analysis to be performed on overall results (Clarke and Stewart, 1994). Single patient data can also allow subgroup analysis. By using individual cases, pooling of data across studies greatly increases sample size and statistical power. This approach is also helpful when analyses are focused on subgroups of patients with similar clinical conditions.

Chapter 2.2 and 3.2 illustrated that many problems may arise in obtaining aggregated or single patient data. Some organisations such as PCAGs are reluctant to supply their individual aggregated or patient data (Khunti et al, 1999a; Khunti et al, 1999b). These organisations and PCGs will need to be reassured that the data supplied will be treated confidentially. There may also be practical difficulties in obtaining data that may be missing or incomplete. The process of data collection should therefore be as simple and flexible as possible so as to help and encourage the participants.

8.4.4 Recommendations

In conventional reviews, data from individual studies are summarised usually using quantitative methods. In these meta-analyses individual studies are weighted according to their size. Whether this also applies to analyses of collated audits still needs to be investigated. The final synthesis of information should involve systematic rather then selective integration. The conclusions of the analyses should not exceed the evidence that is collated. As in normal reviews, quantitative analysis may not be appropriate, for example, if there is heterogeneity in the audit results or the criteria audited are not exactly the same in each audit. In this case the investigators should summarise the primary audits and then draw cautious conclusions. In this thesis these problems were addressed by including data from only three audit groups that had used evidence-based criteria and identical methods of identifying cases, data collection and analysis.

8.5 Potential problems that may be encountered in collating audit data

Large database analysis has been criticised for not offering the rigour associated with randomised controlled trials (Sheldon, 1994). A number of methodological problems must therefore be resolved before collation of audits can be undertaken. It is tempting to compare it to the process of meta-analysis, but the limited quality of data used in audits would probably not permit this. Although meta-analytic techniques have typically been used with randomised or well controlled trials, health policy-makers often have few such studies on which to base decisions (Office of Technology Assessment, 1982). However, methodologies for conducting exploratory research synthesis of poorly controlled studies using low-quality

data are being examined (Yeaton et al, 1995).

The analytical techniques of large database analysis are relatively new, therefore there is little standardisation in the approaches researchers have taken (Paul and Kalasinski, 1994). In order to follow the impact of improved quality assurance programmes, monitoring process will need to allow cross-sectional and long-term comparisons. Quality improvement at local level demands data monitoring which is more sensitive to local clinical activity and has to be consistent, continuous and capable of external comparisons. Because of the large number of databases currently used for recording results of audits, caution must be used when interpreting the results. Rigorous standard coding data sets would make the task easier and more consistent. However, Chapter 2.2 showed that different organisations are using varying audit criteria, data recording and collection, and used different methods of classifying their findings. It has been recommended that audit should be carried out using review criteria that are based on research evidence prioritised according to the strength of the evidence and impact on outcome (Fraser et al, 1997). Criteria of this type require expertise and resources for their development, and therefore may only be developed by a small number of expert groups.

It may be argued that results of collated audit data are not representative of all practices because they include results from a selected number of practices which are motivated to carry out audit. However, this will still identify useful information and will also provide information on realistic attainable local and national standards. Therefore, all practices

should be encouraged and helped to collect the relevant data. If criteria are being set then they must relate to a distinct groups of patients. Therefore a tight definition of the audited population is therefore necessary.

8.5.1 Access to audit data

It is important to collect data from as many sources as possible. District programmes have encountered problems especially in persuading colleagues to co-operate in an enthusiastic and committed manner. (Gumpert and Lyons, 1990) Organisers of multi-practice audits may also be reluctant to provide data at regional or individual patient level (Khunti et al, 1999a; Khunti et al, 1999b) or may not have access to their own audit data (Khunti et al, 1999c). However, there have been calls for sharing research data (Davie-Smith, 1996) and similar arguments exist for sharing audit data. The code of practice on openness in the NHS aims to ensure that people have access to available information about the services provided by the NHS including quality standards (Womack et al, 1997). GPs or hospitals may not have consent from individual patients. It is therefore important that the issue of confidentiality is addressed prior to commencement of the review. This may also involve seeking ethical approval.

8.6 Conclusions

Audit will proliferate in the NHS as a result of the recent governments strategy. Many PCGs will be conducting audits and collating data to monitor performance of their practices. It is likely that PCGs may be auditing the same topics that have been issued by NICE or the

NSF. This chapter has addressed uses and methodological issues of collating audit data. Collation of audit data using evidence-based review criteria may be possible as a means of pooling data from individual audits which can then be used as a method of quality improvement process. However, clear guidelines need to be adhered to if results of collations of data are to be valid. If such collation is to succeed, it will require support of organisations including the PCGs and PCAGs. Efforts need to be placed into developing high quality databases with the potential to bring research closer to practice and audit (Black, 1997). This should include methods for the quality evaluation of audits and synthesising of the results. Measurement of data itself does not improve quality by itself and feedback of results of data analysis is necessary for identification of deficiencies in care and identify where strategies for improvement need to be directed. Results of collated audit should be presented with comprehensive information so that the reader can draw their own conclusions about the validity of the results. Complete confidentiality should be given to the providers of information. The information should be fully compiled and presented carefully and constructively and should not breed mistrust. The way forward would be by the use of national evidence-based review criteria and the use of uniform coding systems. Collation of audit data will be useful for health care providers, purchasers, researchers and policy makers.

8.7 Implications for health policy and future research

- Patient level audit data to explore reasons for large variations in prevalence, delivery of care and quality of care between practices

- Using audit data to measure and reduce absolute risk of coronary heart disease in people with diabetes

- Different models of quality assurance with audit and feedback for implementing findings for UKPDS

- Programme to establish cost effective models of care through primary care groups

- Longitudinal research using audit data to explore changes in prevalence and treatment of diabetes as a result of implementing the findings of UKPDS

- Audit of morbidity and mortality data

- Use of information technology using computerised evidence-based protocols with data extraction using MIQUEST

- Methods of identifying practices that will be successful in implementing change with audit.

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The following articles are included in this thesis:

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Khunti, K. Goyder, E. Baker, R. Collation and comparison of multi-practice audit data: prevalence and treatment of known diabetes mellitus. *Br J Gen Pract* 1999;49:375-379.

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COPIES OF PUBLISHED PAPERS

Collation and comparison of multi-practice audit data: prevalence and treatment of known diabetes mellitus

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SUMMARY

Background. Different methods have been used to determine the prevalence and treatment of diabetes. Despite the large number of studies, previous estimations of prevalence and treatment have been carried out on relatively small numbers of patients, and then in only a few practices in single geographical regions.

Aim. To investigate the feasibility of collating data from multi-practice audits organized by primary care audit groups in order to estimate the prevalence and treatment of patients with known diabetes, and to discuss the methodological issues and reasons for variation.

Method. A postal questionnaire survey of all primary care audit groups in England and Wales that had conducted a multi-practice audit of diabetes between 1993–1995. Prevalence rates and patterns of diabetic care were compared with other community-based surveys of known diabetes from 1986–1996 identified on MEDLINE.

Results. Twenty-five (43%) audit groups supplied data from multi-practice audits of diabetes. Seven (28%) multi-practice audits involving 259 practices fulfilled the inclusion criteria for prevalence estimation. The overall prevalence of diabetes based on a population of 1 475 512 patients was 1.46% (range between audit groups = 1.18% to 1.66%; χ^2 = 308; df = 6; P<0.0001). Male to female ratio was 1.15:1. Treatment of diabetes could be ascertained for 10 (40%) audit groups comprising 319 practices. Of these, 23.4% (range = 16.5%–27.4%) were controlled by diet, 48.5% (range = 43.6%–55.8%) were prescribed oral hypoglycaemic drugs, and 28.2% (range = 25.0%–32.4%) were treated with insulin. There were significant variations between audit groups in treatment pattern (χ^2 = 250; df = 18; P<0.0001).

Conclusion. Prevalence and treatment rates of diabetes and other chronic diseases can be assessed and compared using data from multi-practice audits. Collation of audit data could improve the precision of quantitative estimates of health status in populations. A standard method of data recording and collection may provide a new approach that could considerably improve our ability to monitor disease and its management.

Keywords: diabetes mellitus; prevalence; treatment; multi-practice audits.

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Introduction

MANY studies have been published reporting prevalence rates of diabetes. However, estimates have differed considerably depending on the methods used to determine prevalence.[1-14] General practice surveys of known diabetes prevalence rates have, in recent studies, ranged from 1.2 to 1.8%.[11-14] Methods of estimating prevalence rates have included using GP registers,[5,10,11] postal questionnaires,[1] house-to-house enquiries,[3] hospital registers,[2,7,8] repeat prescription systems,[3] and district diabetic registers.[14] The prevalence rates of known diabetes in recent surveys have been substantially higher.[12-14] Other studies have ascertained total prevalence (including previously undiagnosed cases) using glucose tolerance tests.[15] One study also included a capture–recapture method using multiple independent data sources, and demonstrated a completeness of ascertainment of the survey of 90.1%.[16]

Despite the large number of studies, previous estimations of prevalence have been carried out on a relatively small number of patients[1-9] and in only a few general practices. Some recent studies have involved relatively larger numbers of diabetic patients[10-12] but these have been carried out in single geographical regions. Prevalence estimations from single geographical areas may not be representative of the general population and may fail to identify areas of high prevalence that might need additional support to ensure equity of provision. The aim of our study was to identify and compare possible existing sources of information to estimate the prevalence of known diabetes. We also sought to estimate the treatments of patients with diabetes in the general population. Since the introduction of clinical audit in general practice,[17] many audits have been undertaken and consequently much data about performance have been collected.[18] Audit groups, formerly known as medical audit advisory groups (MAAGs), have been conducting multi-practice audits involving large numbers of general practitioners (GPs).[19] We carried out a study to collate data from multi-practice audits undertaken in different locations around the country, and compared our results with prevalence rates from previous surveys. Therefore, an additional aim of the study was to identify the methodological issues to consider when collating audit data, in order to estimate disease prevalence.

Method

Recruitment

This study was part of a study of the performance measures of care of patients with diabetes. A comprehensive list of audit groups that had coordinated multi-practice audits of diabetes was constructed using information from a survey of audit groups undertaken in 1994, supplemented by a survey of all those groups that had either not responded to the first survey or had responded but reported that no diabetes audit had been undertaken.

A data collection form was produced, which requested details of diabetic treatment, number of patients included in the audit, and the total number of patients in the practices. The data collec-

tion form was piloted in six audit groups prior to being sent to all groups that had undertaken a multi-practice diabetic audit. A reminder and data collection forms were sent to non-responders and they were also followed up by a telephone call. The results were transferred to summary sheets. To ensure optimum data quality, audit group staff were asked to verify the information and to provide any missing data. Returned data were reviewed by two members of the project team and transferred to a database.

Criteria for inclusion
The criteria for inclusion of the multi-practice audits were as follows:

- *Diagnosis of diabetes mellitus*. Data were included if the audit group had conducted the multi-practice audit on all patients with diabetes in the practice. Audits were excluded if they had included only a subset of patients with diabetes; for example, only those with type 1 or type 2 diabetes. Since the criteria for classifying diabetes as insulin dependent varies, patients were classified according to treatment (insulin, oral hypoglycaemic drugs only, or diet only).
- *Representative population*. Although studies of specific groups (for example, groups classified by ethnicity or deprivation) yield useful information about prevalence, only a population-based study can provide rates suitable for comparison between audits.[20,21] Audits that included only patients in specific groups or ages were therefore excluded.
- *Accurately defined denominator*. Information on the population at risk had to be available so that appropriate denominators could be used to estimate the prevalence. Age and sex information was not generally available for either the diabetic population or the practice population.
- *Large populations*. Small practice numbers in an individual multi-practice audit may signify a high degree of self-selection by involved practices. If audits involving few practices have systematically included those with higher or lower prevalence than average, this could represent a potent source of bias. Therefore, only multi-practice audits that had more than 1000 diabetic patients were included in this study. This figure was arbitrary and was based on the assumption that audits with small numbers of patients may include a biased sample of practices.
- *Audits conducted for similar periods*. Prevalence rates over different periods cannot be easily compared with each other. The longer the time over which rates are averaged, the more they will reflect secular trends.[22] Only data on multi-practice audits completed between 1993 and 1995 were collated.

A pooled analysis was performed on the data supplied by audit groups satisfying these inclusion criteria. For comparison of prevalence rates with other studies, a MEDLINE search from 1986–1996 was conducted to identify previous community-based surveys in the United Kingdom (UK) that reported total prevalence and treatment of known diabetes. Search terms included diabetes mellitus, prevalence, treatment, and management. Any cross-references from these studies were also included. Only studies that estimated the prevalence of all known diabetes (type 1 and type 2) conducted in the UK were identified.

Results
Prevalence
Twenty-five (43%) audit groups out of the 58 that had completed the first cycle of a diabetic audit supplied data from multi-practice audits of diabetes. Of the 25 audit groups that supplied the data, only seven (28%) multi-practice audits involving 259 practices

provided data on the denominator. All seven audits fulfilled all other inclusion criteria for prevalence estimation. Data from other audit groups could not be used because they were audits of the structure of care, or data were supplied as bar chart percentages, or they were conducted on specific sub-groups. Three audit groups were from the north of England, three from the south, and one was from Wales. In our study, the overall prevalence of diabetes in a total population of 1 475 512 people was 1.46%. There was considerable variation in prevalence between the seven groups, with rates ranging from 1.18% to 1.66%. This variation was highly statistically significant and so cannot be attributed to random variation ($\chi^2 = 308$; df = 6; $P<0.0001$). Four audit groups supplied the data for the sex distribution of diabetes mellitus, giving an overall male to female ratio of 1.15:1. Audit groups used various methods of identifying patients with diabetes (Table 1). Table 2 shows the prevalence of known diabetes in other recently published community studies.

Pattern of diabetic care
The treatment of diabetes could be ascertained for 10 (40%) audit groups comprising 23 423 patients from 319 practices (Table 3). Table 4 shows the treatment of diabetes from our collated audit data in comparison with other recently published studies. Overall, 23.4% were controlled by diet alone, 48.5% were being prescribed oral hypoglycaemic drugs, and 28.2% were treated with insulin. There were significant variations in treatment pattern ($\chi^2 = 250$; df = 18; $P<0.001$).

Discussion
The prevalence of known diabetes in our study of nearly 1.5 million people from 259 practices was 1.46%, which is similar to the rates found in recent large studies.[12,13] However, recent surveys in single geographical regions have reported higher prevalence rates.[10,14] The study by the Royal College of General Practitioners (RCGP) centennial practices[13,23] showed a prevalence of 1.6%. This was based on 5678 diabetic patients from 48 different practices who are particularly motivated, providing weekly returns to the RCGP. These practices are larger, employ more trainee doctors, and have younger doctors.[24] The prevalence of 1.8% in the study in Tyneside[14] was based on only 559 diabetic patients. Previous surveys have been carried out in single geographical areas and may not therefore be generalizable to the UK as a whole. Our results from seven geographically different populations may therefore provide a better estimate of current prevalence in the UK.

The percentage of diabetic patients treated by diet alone in previous surveys has ranged from 16.0%–28.7%. For oral hypoglycaemic drugs the range has been 40.4%–54.0%, and for insulin, 25.0%–39.5%. The results in our study are therefore comparable. This study also reported a slightly higher prevalence rate of diabetes mellitus in males which has been observed in previous studies.[11,13,14]

Issues that merit further consideration are the possible causes of bias in this type of data collection and the possible reasons for the significant variation in prevalence and treatment patterns in different areas. The extent of variation is sufficient to call into question the appropriateness of aggregating data from different audits in different areas.

Sources of potential bias
To estimate the prevalence of a disease, it is important to study a large, unbiased population sample. In collating audit data, sources of bias may include information bias, diagnostic and ascertainment bias, and selection bias.[22]

Table 1. Prevalence of diabetes estimated for seven audit groups. (NR = not reported.)

Audit group	Year audit completed	Number of practices undertaking audit	Total number of patients	Total number of patients with diabetes	Male: female ratio	Percentage prevalence of diabetes (95% CI)	Methods used for identifying patients with diabetes
A	1995	33	197 246	2702	1.07:1	1.37 (1.32–1.42)	a,b,c,d,e,f
B	1995	29	145 056	2283	1.18:1	1.57 (1.51–1.64)	a,b,c
C	1995	39	257 364	3541	1.22:1	1.38 (1.33–1.42)	a,b,c,d,e,f
D	1995	33	117 447	1923	NR	1.64 (1.57–1.71)	a,b,c,f
E	1994	41	218 492	2574	1.1:1	1.18 (1.13–1.23)	Practices responsible for identifying patients
F	1993	21	138 746	1881	NR	1.36 (1.30–1.42)	a,b,c,f
G	1993	63	401 161	6671	NR	1.66 (1.62–1.70)	b,c

a = disease register; b = patient records; c = computer records; d = district register; e = hospital register; f = repeat prescriptions.

Table 2. Prevalence studies of known diabetes (type 1 and type 2) in total populations from 1986–1996. (NR = not reported.)

Study	Year study undertaken	Number of diabetic patients	Number of practices	Method of identifying diabetic patients	Prevalence (%)	Range
Norwich[4]	1987	590	8	GP notes, prescriptions, case ascertainment	1.28	NR
Powys[5]	1989	469	NR	GP registers	1.01	NR
Tyneside[6]	1991	668	12	GP registers/records	1.30	NR
Trowbridge[7]	1992	405	NR	GP and hospital registers	1.31	NR
Islington[8]	1992	4674	NR	GP and hospital registers, PPA returns	1.17	NR
Bristol[9]	1992–1993	1082	8	Observation data from practices	1.51	1.31–2.29
Poole[10]	1992–1993	4130	36	GP records	1.60	0.8–2.6
Tunbridge Wells[11]	1993	2574	41	GP registers	1.18	NR
Manchester[12]	1993	3463	64	GP records	1.20	0.49–2.15
RCGP Practices[13]	1993	5678	48	Network of sentinel general practices	1.60	1.2–2.8
North Tyneside[14]	1994	559	NR	District diabetic register	1.80	NR

Table 3. Treatment of diabetes for 10 audit groups.[a]

Audit group	Total number of patients (%)		
	Diet alone	Oral hypoglycaemic drugs	Insulin
A	687 (27.2)	1134 (44.9)	706 (27.9)
B	624 (27.4)	1064 (46.8)	587 (25.8)
C	814 (23.2)	1771 (50.5)	921 (26.2)
E	424 (16.5)	1326 (51.5)	824 (32.0)
F	257 (17.6)	815 (55.8)	389 (26.6)
G[b]	422 (22.7)	959 (51.6)	477 (25.7)
H	529 (23.0)	1197 (52.0)	576 (25.0)
I	313 (25.6)	591 (48.4)	317 (26.0)
J	353 (26.9)	580 (44.1)	381 (29.0)
K	1052 (24.0)	1914 (43.6)	1419 (32.4)

[a]Treatment for 638 patients not known. [b]Systematic sampling used.

Table 4. Treatment of diabetes in previous studies compared with that of pooled audit data.

Study	Year study undertaken	Number of diabetic patients in study	Treatment		
			Diet alone	Oral hypoglycaemic drugs	Insulin
London[20]	1988	378	17.0	46.0	35.0
Poole[2]	Not reported[a]	917	20.1	40.4	39.5
Powys[5]	1989	469	16.0	54.0	30.0
Dudley	1989–1990	452	21.7	53.3	25.0
Tyneside[6]	1991	668	23.5	47.0	28.7
Trowbridge[7]	1992	405	19.0	51.0	30.0
Bristol[9]	1992–1993	1082	28.7	46.1	25.1
Poole[10]	1992–1993	4130	23.2	45.6	30.4
Tunbridge Wells[11]	1993	2574	16.5	51.5	32.0
Collated audit data	1993–1995	23 423	23.4	48.5	28.2

[a]Study published in 1988.

Information bias may arise from inaccurate data collection. Retrieval of data can be difficult and must be carried out by someone with experience of general practice records. It is difficult to confirm details of audits and accuracy of the diabetic registers of individual practices, and a major limitation in the collation of audit data may be poorly conducted data collection.

Diagnostic bias occurs if, for example, participating practices have categorized a higher proportion of their population as diabetic through use of incorrect diagnostic criteria, opportunistic glycosuria screening, or a lower clinical threshold for diagnostic testing. Ascertainment bias may occur if different methods are used to identify individuals with diabetes for audit purposes in different areas. The methods used in these audits for identifying patients with diabetes are comparable to the methods used in previous studies. However, it was not possible in our survey to check the validity of the diagnosis of patients reported to have diabetes.

Selection bias will occur because of the self-selection of practices that undertake multi-practice audits and in the selection of audit groups that provide data and have appropriate data for comparison or aggregation. Our study of performance measures for the care of patients with diabetes did show that the practices represented the expected range of partnership size. However, there is also some evidence that the practices that do not provide structured care (and are probably less likely to contribute to multi-practice audit) may differ systematically in terms of prevalence.[25]

All these potential biases would be reduced by an increase in the standardization of these types of multi-practice audits and the inclusion of a large number of practices. The data would then be more directly comparable and the practice populations more representative of the whole population.

Explanation of variations between multi-practice audits

Despite the potential for bias, the large variations observed are also likely to reflect real geographic differences in prevalence and treatment patterns. Variations could be due to demographic differences between populations. Our study has reported crude rates, and comparisons are therefore difficult because age-specific and age-adjusted rates could not be ascertained. However, individual patient audit data would allow estimation of age-specific prevalence and treatment of patients with diabetes. Rates also vary appreciably between ethnic groups[26] and with deprivation.[27] Investigation of these issues is not usually possible when aggregating multi-practice audit data, but comparison can highlight unexpected differences or local deficiences in care that merit further investigation. Thus, such data may act as a stimulus for improvement in care with the potential for reduction in equity. These data may also assist in local purchasing and providing bodies with service development.

There is evidence over the past decade that the number of diabetic patients has increased.[28] In planning future health care, the monitoring of trends such as prevalence and incidence is a necessary prerequisite. Aggregated audit data from comparable audits can be one way of monitoring such trends. The findings in our survey are consistent with the secular rise in the prevalence of diagnosed diabetes that has been observed in previous studies.[1] However, it is not possible to be sure to what extent the increase is due to improved detection. Only population surveys that assess the prevalence of undiagnosed diabetes can distinguish increases in true prevalence from improved detection rates. Nevertheless, comparison of audits over time could provide useful evidence of local and national secular trends.

The creation of continuous morbidity registers to obtain data of sufficient quality for epidemiological purposes has been proposed previously.[13] Burnett and colleagues concluded that the task of developing district diabetic registers may prove a major task in many inner-city health districts.[8] It has been argued that the identification of all diabetic patients is within the competence of GPs, and audit groups may have a role in coordinating annual identification of patients and evaluating the care that they receive within the district.[11]

This study shows that the method used in this survey is practical and suitable for epidemiological studies. It does not demand cooperation of patients and it includes all patients regardless of age. This type of study is relatively simple and inexpensive to perform. Although it cannot replace epidemiological field surveys, it can give a reasonably fair estimate of prevalence in a population. Data from studies similar to this may permit insight into local public health and indicate ways to improve care. Formal training and standardization of data collection are desirable, and it may be appropriate for audit groups to undertake such training prior to setting up a multi-practice audit for any chronic disorder. Accuracy can be increased if the information could be transmitted electronically to a district health authority or to a central register that carried out prevalence estimations, similar to that set up by the RCGP centennial practices.[13] If GPs are willing to attain this level of recording then it would be in the interest of audit groups and the National Health Service (NHS) to direct resources to support them in two ways; first by providing training in data recording and collection, and secondly by providing means of collating and transmitting data for aggregation. Further research also needs to be carried out into the best methods of collating and aggregating audit data. In our study, there were large differences between the audits regarding audit design, and consequently only just over a quarter of audits could be used to estimate the prevalence. A standardized audit protocol could reduce the influence of methodological problems and thereby the variation in reported prevalence. With careful and appropriate use, this would provide a new approach that could considerably improve our ability to monitor disease.

We conclude that the prevalence rates of chronic disorders can be assessed and compared using data from multi-practice audits. The collation of audit data could improve the precision of quantitative estimates of health status in populations and increase understanding of variation between populations.

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Quality of care of patients with diabetes: collation of data from multi-practice audits of diabetes in primary care

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Khunti K, Baker R, Rumsey M and Lakhani M. Quality of care of patients with diabetes: collation of data from multi-practice audits of diabetes in primary care. Family Practice 1999; **16**: 54–59.

Background. GPs are now playing a greater role in the care of patients with diabetes. The challenges described in the Saint Vincent Joint Task Force Report include achievement of a reduction in long-term complications by collecting key clinical information and systematically organizing care of patients with diabetes. The number of practices conducting audit and the number of primary care audit groups conducting multi-practice audits of diabetes have increased since the introduction of audit in 1991.

Objectives. We aimed to determine the feasibility of collating data from multi-practice audits of diabetes in primary care and to describe the pattern of care for diabetes patients in primary care.

Methods. A confidential postal questionnaire was sent to all medical audit advisory groups that had completed a multi-practice audit of diabetic care. The main outcome measures studied were prevalence and treatment of known diabetes and annual compliance with key process measures.

Results. Data could be collated for 17 of the 25 audit groups that supplied data representing information from 495 practices with 38 288 diabetic patients. Seven audit groups supplied data from a population denominator comprising 1 475 512 patients giving a prevalence of 1.46% (range 1.1–1.7%), 50.7% (range 32.5–69.0%) were managed by general practice only, 19.1% (7.6–39.7%) by hospital care only and 30.2% (11.0–49.5%) by shared care. Annual mean compliance for process measures showed wide variations: glycated haemoglobin or fructosamine checked for 75% (range 25.3–89.3%), fundi checked for 67.5% (57.8–86.6%), urine checked for 65.8% (7.5–80.0%), blood pressure checked for 87.6% (76.9–96.5%), smoking checked for 71.45 (11.9–86.0%), feet checked for 67.7% (40.0–90.8%) and BMI checked for 52.5% (26.4–68.2%).

Conclusion. This study shows the feasibility of collating audit data and the potential of this approach for describing patterns of care and highlighting general and local deficiencies. Information about levels of performance in large numbers of patients can be used to set standards and norms against which individual practitioners can compare their own activity. Comparison of the health needs of local populations with national data could be used to inform commissioning services. However, audits should employ uniform evidence-based criteria so as to facilitate collation and allow comparison.

Keywords. Diabetes, multi-practice audit, primary care audit groups, process of care.

Introduction

Diabetes poses special problems for primary care because adverse outcomes may only occur after many years. GPs are now playing a greater role in the care of their patients

with diabetes,[1] a trend which may continue, as practical steps are being taken to develop the framework for a primary-care-led NHS. One report reviewed the literature and concluded that primary care can be as effective as secondary care when judged by commonly used performance measures such as frequency of laboratory tests, frequency of review and measurement of glycated haemoglobin.[2] However, the level of performance in primary care was variable and therefore more evidence is needed about methods and outcomes to ensure the effectiveness of primary care (and also shared care) for diabetic patients.

Diabetes registers are central to the running of an organized diabetes service, although they may be difficult to compile.[3] Regulations for disease management clinics in general practice require practices to report annually to the health authority about the number of diabetic patients on their lists, how many are dependent on insulin and how many have had an annual review.[4] This requires individual practices to maintain their own registers. There have also been calls for the creation of local diabetic registers by aggregating registers of individual practices.[5] Furthermore, it has been suggested that the responsibility for identifying all diabetics in the population is a task for GPs, and that medical audit advisory groups (MAAGs) could develop a role in co-ordinating the annual identification of patients and evaluation of the care that they receive.[5]

Well-accepted measures of the quality of diabetes care include: annual assessment of eyes, feet and urinary albumin, measurement of blood pressure, assessment of glucose and lipid levels, and enquiry and advice about smoking habits.[6-9] These are all aspects of care which can be monitored by audit. The number of practices conducting audits and the number of audit groups conducting multi-practice audits have increased since the introduction of audit in 1991.[10] A multi-practice audit has been defined as 'an audit that involves two or more general practices together undertaking the same audit, agreeing the same standard of care to be achieved, collecting the same data, comparing the results individually or collectively, implementing necessary changes, and later collecting data again to measure the effectiveness of those changes'.[11] In this type of audit, the local audit group designs the project, the participating practices collect the required data, and the audit group collates and feeds back information to practices on a comparative basis. This can encourage a large number of GPs to participate, leading to improvement in care.[12]

Collation of audit data would have many potential uses. It could provide data for assessing health needs, planning and audit.[13] The data might also provide information about the quality of care, and allow comparison of performance between different audit groups or localities. However, the practicality of collection and collation of audit data has not been determined. Therefore, the aims of this study were to determine the feasibility of collecting data from multi-practice audits and to describe the pattern of care of diabetes in primary care.

Methods

Recruitment
A complete list of all 106 primary care audit groups was available during the study period 1995–1996. A list of audit groups which had co-ordinated multi-practice audits of diabetes was constructed using information from a survey of audit groups undertaken in 1994.[14] To ensure that no diabetes audit was overlooked, this was supplemented by a letter and return pro forma sent to the chairs of all those groups which did not report a diabetes audit in the first survey. A total of 74 audit groups were identified as having been involved in diabetes multi-practice audits. However, only 58 audit groups had fully completed one data collection set.

A workshop was held for local audit groups to discuss the practicalities of collating results and to explore issues of confidentiality over the sharing of information with other groups. Subsequently, a set of rules was established to provide groups with assurance about the security of their data. Groups were given unique codes for identification purposes, and it was confirmed that data would be viewed only by members of the project team and not disclosed to any third party without agreement from the group. The feedback report was sent to a single named individual identified by the respective group. The anonymity of data from practices or groups in any subsequent reporting was guaranteed.

The workshop also provided a forum in which to discuss the proposed content of the instrument to collect data. A data-collection form was produced which requested details of diabetic treatment, number of patients included in the audit, numbers of patients in the practices and the process and outcome criteria employed. The instrument was reviewed in the light of comments received at the workshop and by a pilot carried out with six groups. It was then sent to all audit group co-ordinators who had undertaken a multi-practice diabetes audit. Co-ordinators were also asked to provide aggregated audit results by a method of their own choice such as an audit report, computer printout, computer disk or summary sheet designed by us. Data returned to the Centre were reviewed by a member of the project team and transferred to a summary sheet which included the audit criteria that were used in the majority of audits. Information transferred to this sheet was independently checked by a second member of the project team. Non-responders were sent a reminder letter and were asked to complete and return the questionnaire and summary sheet within a further 3 weeks and were also telephoned by KK. To ensure optimum data quality, responding co-ordinators were asked to verify the information on the summary sheet and to provide any missing data, wherever possible. Data from the summary sheets were then processed in a spreadsheet (Excel 5) and a standardized report was produced for each audit group.

Results

Twenty-five out of the 58 groups (43.1%) supplied data from the multi-practice audits of diabetes that they had carried out. Twenty-one groups did not respond, although they agreed on the telephone to supply the data; five groups refused, three had difficulty accessing

data and four did not send results, as their audits were of the structure of care. Data could be collated for only 17 of the 25 groups, representing information from a total of 495 practices with 38 288 diabetic people. Data from the remaining eight groups could not be used for various reasons: some were audits of the structure of care or were conducted on specific age groups. For others, data were supplied as bar-chart percentages, rather than the original figures.

The 17 audit groups were located throughout England and Wales, and were responsible for both inner-city and suburban locations. A mean of 29.1 practices per audit group (range between groups = 10–63) had conducted the multipractice audit. Fifteen (88.2%) groups had conducted the audit since 1992 and seven (41.2%) had conducted the audit in 1995. There was no difference between the number of GPs and the number of practices in audit groups whose data were used and those numbers for groups by whom data were not provided or by whom unusable data were provided.

Twelve audit groups, with a total of 310 (62.6%) practices, supplied information about the number of principals per practice (Table 1). The prevalence of diabetes could be ascertained for seven audit groups.[15] There were 21 575 patients with diabetes in a total population of 1 475 512 patients, giving a crude prevalence of diabetes of 1.46% (95% CI 1.44–1.48, range between groups of 1.1–1.7%).[15] Just over half the patients (50.7%, range 32.5–69.0) were under GP care, 19.1% (range 7.6–39.7%) were under hospital care and 30.2% (range 11.0–49.5%) were under shared care. The number of patients receiving different types of treatment are shown in Table 2. The most common process measures investigated in the audits and the level of compliance for each are shown in Table 3. In collating data, it was assumed that even if a procedure had been carried out, if it had not been recorded then the criterion of care was not complied with. Few groups sought information about outcome measures.

Discussion

Although many studies have investigated the management of diabetic patients in primary care, most have involved fewer than 1000 patients.[16-18] Very few studies have involved the aggregation of data from large-scale surveys. For example, Howitt and colleagues[5] studied the care given to 2574 patients, and Bennett and colleagues studied 3463 patients.[19] Our study is the largest that we have identified, and involved 17 audit groups from different parts of the country, with the total number of diabetics being in excess of 38 000.

Feasibility of collating audit data

Just over 40% of audit groups were willing or able to provide details of their audits. Over one-third agreed on the telephone but did not supply any data. Despite

TABLE 1   Practice participation in audit of diabetes by size of partnership[a]

Practice size (No. of principals)	No. of practices (%)
1	48 (15.5)
2–3	91 (29.3)
4–6	141 (45.5)
≥7	30 (9.7)

[a] Size of practices not known for 185 practices.

TABLE 2   Treatment of diabetes

	No. of audit groups supplying data	No. of Patients	% (range between groups)
Insulin	15	9778	27.4 (19.8–32.0)
Diet alone	11	5610	23.2 (16.5–27.3)
OHD	11	11731	48.6 (42.9–59.2)

concerted efforts to allay fears over confidentiality of audit groups, this evidently remains a concern for some groups. Collation of audit data from a larger number of audit groups could improve the precision of quantitative estimates. Modern information technology should help to provide anonymized data for local, regional and national research and analysis.[20]

Validity of audit data

One reservation is that general practice registers have previously been thought to be inaccurate[5] and we were unable to check the accuracy of registers. Furthermore, we were unable to validate the results of the individual practice audits. The practices in this study were self-selected and may not be typical of all practices; for example, they may have been particularly interested in diabetes. However, practice size was known for nearly two-thirds of practices and this information indicated good representation of partnership size.[21]

Despite these qualifications, the validity of findings about diabetes care in this study reflects those reported in other studies. Collation of multi-practice audit data has been shown to be a valid method for estimating the prevalence and treatment of diabetes.[15] The prevalence of diabetes of 1.46% compares well with that found in other recent studies.[15] The new health promotion arrangements for GPs may have encouraged efforts to improve the accuracy of general practice registers.[22] Furthermore, nearly all the audit groups had used a

TABLE 3 *Process measures completed for patients with diabetes mellitus*

Process measures completed	No. of groups using criterion (%)	No. of patients	% compliance with criterion (range between audit groups)
HbAlc or fructosamine checked in the last 12 months	16 (94.1)	22 633	72.5 (25.3–89.3)
Fundi checked in the last 12 months	12 (70.6)	15 613	67.5 (57.8–86.6)
Urine checked in the last 12 months	12 (70.6)	16 253	65.8 (27.5–80.0)
Blood pressure checked in the last 12 months	11 (64.7)	20 912	87.6 (76.9–96.5)
Feet checked in the last 12 months	11 (64.7)	17 183	67.7 (40.0–90.8)
Smoking checked in the last 12 months	10 (58.8)	14 223	71.4 (21.9–86.0)
Patient reviewed in last 12 months	7 (41.2)	11 329	85.5 (51.9–94.3)
BMI checked	7 (41.2)	7403	52.5 (26.4–68.2)
Visual acuity checked in the last 12 months	7 (41.2)	10 450	62.7 (51.9–74.0)
Weight checked in the last 12 months	5 (29.4)	7622	72.9 (66.1–77.4)
Creatinine checked	5 (29.4)	4814	49.0 (40.0–67.3)
Lipids checked	4 (23.5)	2544	37.5 (15.7–46.6)
Diagnosis of diabetes correct	3 (17.6)	10 153	99.6 (99.2–100)
Diabetic patients on a register	3 (17.6)	9234	98.2 (92.2–99.3)
Blood sugar checked in the last 12 months	3 (17.6)	4764	84.3 (80.7–89.6)
Assessment of symptoms in the last 12 months	3 (17.6)	7422	80.6 (32.6–90.0)
Diet reviewed in the last 12 months	3 (17.6)	3402	62.1 (48.0–92.2)

combination of methods to identify patients for inclusion in their audits. This study has reported crude rates, but rates will vary with age,[23] ethnic groups[23] and with deprivation.[24] Our study has shown that just over half of patients received care from their GPs, a figure which is similar to the proportion reported in a recent study.[25] Over 20% received shared care, a level comparable with other studies.[16,19] The proportion of male and female patients in our study was also not dissimilar to that found in other large scale studies.[15,26]

Selection of criteria
A previous survey of diabetic care provided by GPs showed that one of the barriers to effective care was lack of time.[16] One strategy to address this problem would be for GPs to concentrate on those aspects of care which research confirms are the most important. Elements of care which evidence confirms are important in the management of diabetic patients include the monitoring of eyes, feet, blood pressure and urine protein.[9] Advice about diet and lifestyle is also indicated. The St Vincent's declaration demands that these elements of care should be systematically organized and competently performed.[27]

This study shows that there are wide variations in the criteria chosen for audit of diabetes. One factor that clearly needs to be addressed is the choice of criteria, which at present are often not linked to research evidence, even though practical methods for developing criteria are

available.[28,29] Evidence-based criteria would help ensure uniformity of data definitions, and facilitate the collation of data for comparison over time and among facilities.[20] This would identify areas of weakness in health care delivery and encourage improvements in accordance with the St Vincent's objectives. The final report of the St Vincent Joint Task Force for diabetes care in the UK emphasizes the need for up-to-date and continuing education and support for people with diabetes in a local, comprehensive and organized setting.[8] The Task Force has also raised the question of developing 'population-based diabetes registers' to assist in covering the clinical needs of all patients and to help collect key clinical information.[8]

Care of patients with diabetes
The challenges described in the St Vincent Joint Task Force Report include achievement of a reduction in long-term, disabling complications of diabetes.[8] There is also good evidence that many of these complications may be delayed or prevented.[30] Despite the contractual arrangements for health promotion,[22] this study has highlighted a number of deficiencies in care, and wide variations in performance between audit groups. The quality of care for patients with diabetes in this country clearly needs improving. Although it may be impossible to achieve uniform and ideal control in every patient with diabetes,[31] many practices need to take steps to attain higher standards of care.

Information about levels of performance in large numbers of practices may have a role in improving care. For example. information can be used to set standards of care[19] or norms.[32] Targets based on normative data derived from comparable care settings are likely to be more easily attainable.[33] Collation of data from national sources as in our study can be used as a method to develop norms against which individual practitioners can compare their own activity. Peer comparison of audit groups may also be a tool for improving standards of care. It can indicate elements of care for which performance is poor in comparison with other localities. Local providers can then concentrate their efforts on improving these aspects of care. Differences in care between localities may merit investigations to identify reasons for variations and may therefore act as a stimulus for improvement in care. Locally developed guidelines disseminated through practice-based intervention have been shown to improve the management of diabetes as assessed according to these evidence-based criteria.[34] Comparison between audit groups could also act as a stimulus to quality of audits. Collated data can also be used to highlight aspects of care which are particularly poor throughout the country. These can then be addressed in education programmes. or emphasized in guidelines or targeted by other strategies.

Conclusion

This study has shown the feasibility of collating audit data and the potential of this approach for describing the pattern of care and highlighting general and local deficiencies. The method may be applicable to other conditions in addition to diabetes. The wider use of evidence-based criteria would improve the effectiveness of individual audits and also facilitate the collation of data. The comparison of health needs of local populations with national data could be used to support commissioning of services to meet these needs. The data might assist purchasing and providing bodies in defining aspects of care that are less than ideal and in indicating options for service development or quality improvement. The study has also demonstrated wide variations in performance. The quality of care for diabetics should be improved, but the choice of methods for quality improvement needs to be supported by research into aspects of care which are particularly poor throughout the country. Collation of data at practice level would allow identification of reasons for variations in care of patients with diabetes. These can then be addressed.

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Approaches to the organization of multi-practice audits in primary health care in the UK

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Abstract

Objective. To investigate the approaches taken by audit groups in primary care in organizing multi-practice audits and to identify the strengths and weaknesses of the methods used.

Design. Postal questionnaire survey.

Setting. One hundred and six primary care audit groups in England and Wales.

Results. Ninety multi-practice audits had been conducted since 1993, 46 of which were audits of diabetes and 44 of asthma care. A total of 48 completed questionnaires (24 each for asthma and diabetes) were returned (response rate 53%). Audit groups reported inviting 3338 practices to take part, of which 1157 completed the audit. The commonest methods used to encourage practice participation were a personal letter (75%), audit group newsletter (63%) and sending an audit protocol to the practice (63%). Groups used various methods for selecting audit review criteria, however only three (6%) used a systematic review of available literature. Each audit group advocated a number of methods for identifying patients and for data extraction. Forty-one (85.6%) groups reported that practices received feedback of results in an individualized practice feedback report. In 19 (39.6%) audits, the audit group had not undertaken any follow-up.

Conclusions. The findings indicate that multi-practice audit can encourage the participation of large numbers of practices. Audit groups are co-ordinating multi-practice audits and feeding back information to practices on a comparative basis. However, there are weaknesses in the design and conduct of some audits. Groups should pay more attention to the selection of audit criteria, methods of identifying and sampling patients, data collection procedures, and methods for implementing changes in performance. For other countries that are beginning quality improvement activities, the results of this study emphasize the need to give attention to basic methodological principles.

Key words: asthma, diabetes, multi-practice audit, organization, primary care audit groups

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A major reform of the National Health Service in the UK made clinical audit a requirement for all doctors [1]. Clinical audit has, therefore, become a universal activity among health professionals and the principal mechanism for quality assurance within the UK. As a consequence, audit groups, formerly known as medical audit advisory groups (MAAGs), were introduced in 1991 with the objective of encouraging participation in audit of all general practitioners [2]. MAAGs have been funded centrally from the Department of Health, and some groups have secured additional funding from research grants, local authorities and pharmaceutical companies. MAAGs have appointed a team of around 12

members which include a chairperson, co-ordinator and facilitators. Membership is multi-disciplinary and includes general practitioners, representatives of nurses and Departments of Public Health. Audit groups are usually chaired by active clinical professionals [3]. The activities undertaken include providing training on audit, actively promoting audit by individual teams and organizing audit-projects in which large numbers of practices are encouraged to participate (multi-practice audit).

MAAGs were given the remit of 'directing, co-ordinating and monitoring audit activities', but were left to decide for themselves the particular approaches they would use [2].

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Recent studies have shown considerable variation in ways in which audit groups have promoted audit, and in the progress and development of audit activity within general practices. Humphrey et al. found that the strategies adopted by groups depended upon the perceptions and attitudes of group members, in particular of the group chairperson [4]. A recent study has indicated greater involvement of practices in audit, and improvement in the quality of the audit [5]. This study also showed that audit groups used a wide range of methods to involve practices in audits of single topic multi-practice audits [5]. As these audits require substantial funding and involve considerable effort, information is needed about their organization [6,7].

Some reports of multi-practice audit leading to improved performance have been published. The topics addressed include vitamin B12 prescribing [8], benzodiazepines [9] and diabetes [10]. A possible advantage of multi-practice audits is that they can familiarize large numbers of general practitioners with the practicalities of audit, perhaps including many small practices which are sometimes quite isolated [5]. A further advantage is that the audit review criteria are uniform for all of the general practitioners within the audit group. As many as 68 multi-practice audits of diabetes care relating to 1611 practices and 53 audits of asthma care relating to 973 practices had been identified by 1993 [5].

To date, however, little is known about how audit groups conduct multi-practice audits. The aim of our study was to investigate the approaches taken by audit groups in primary care in organizing multi-practice audits, and to identify the strengths and weaknesses of the methods being used.

Method

All 106 audit groups in England and Wales were asked whether they had undertaken multi-practice audits of either diabetes and/or asthma. This was undertaken by compiling information obtained in a previous survey supplemented by a letter and data collection form sent to all audit groups which had not already reported as undertaking an audit of this type [5]. The topics of diabetes and asthma were chosen because they were by far the most common topics for multi-practice audit, and collection of standard information would be more practical with a limited number of topics.

A structured questionnaire was developed to capture information from the audit group on the conduct, design, methodology and organization for each asthma and diabetes audit. The content of the questionnaire was the same for both conditions, apart from a small number of questions specific to the clinical topic. The instrument included questions about: methods used to encourage practice participation; completion of the cycle; level of audit group involvement in funding; planning, supporting and reporting on the audit; the methods used for selecting audit criteria and for identifying and selecting patients; the sources of data for the audit; and standard setting. All questions were in a closed format with multiple response choices.

To pilot the questionnaire, a workshop was held for local

Table 1 Size of practices (total 3798)

Number of partners in practice	Proportion of practices (%)
One	806 (21.2)
Two to three	1122 (29.5)
Four to six	1119 (29.5)
Seven or more	193 (5.1)
Not known	558 (14.7)

audit groups to discuss its contents. It was also sent to a convenience sample of six audit groups. Some revisions were made in the light of comments from these groups. The pilots also revealed that audit groups were reluctant to share information about early audits as they felt they had been at a learning stage and, in consequence, the audits were poorly conducted. Furthermore, a national guideline [11] and protocols for the management of asthma [12] and diabetes [13] were only available after 1993. The final questionnaire therefore asked only about audits conducted since January 1993.

The final questionnaire was posted to audit group co-ordinators (or the equivalent lead person) for each multi-practice audit, together with a covering letter. Co-ordinators were asked to complete and return the questionnaire within a 3-week time period. Co-ordinators were then followed-up by a telephone call. Continuing non-responders were sent a reminder letter and an additional copy of the questionnaire. All returned questionnaires were edited and then entered into Epi Info.

Results

A total of 90 multi-practice audits had been conducted since 1993, 46 of which were audits of diabetes care and 44 of asthma care. A total of 48 completed questionnaires (24 each for diabetes and asthma) on the organization of these multi-practice audits were returned by audit groups within the study period (December 1995–April 1996), an overall response rate of 53%. Seventeen audit groups had conducted a multi-practice audit of both asthma and diabetes. Fourteen (29.2%) audits reviewed were organized in collaboration with other health care organizations as 'interface audits'. All of these had been initiated by the audit group, although they were undertaken jointly with either hospital services or other agency such as a group of optometrists.

Practice participation in audit

The 48 audit groups were responsible for a total of 3902 practices (mean 81.3 practices per audit group; range 17–223) of which around one-fifth were single-handed practices (Table 1). However, not all practices had been invited to participate. Audit groups reported inviting 3338 practices (mean 69.5 practices per audit group; range 5–223) to participate in the

ble 2 Methods used to encourage practice participation

Methods	Number of audits using method (%)
direct	
Letter/mailshot	36 (75)
Audit group newsletter	30 (63)
Audit protocol sent to practice	30 (63)
direct	
Personal visit	16 (29)
Telephone call	14 (29)
Launch meeting	12 (25)
centive	
Postgraduate accreditation	7 (15)
Reimbursement of costs	13 (28)
Award/prize	1 (2)

Table 3 Methods used for selecting audit criteria

Method	Number of Audit Groups using method (%)
Consultation with local specialists	24 (50)
Consultation with local GPs	21 (44)
National guideline/protocol	21 (44)
Literature review e.g. using Medline	13 (27)
Informal reference to literature	12 (25)
Local guideline/protocol	11 (23)
Lilly Centre audit protocol	7 (15)
Systematic literature review e.g. Effective Healthcare Bulletin	3 (6)
Consultation with patients	0 (0)

dits. Forty (83.3%) audits included in the study were open to practices, but six (12.5%) were organized for selected practices within a specific locality, and only two (4.2%) involved several dit groups together, organized on a regional level. Of the actices invited to participate 1198 (35.9%) agreed to undertake audit (mean 25 per audit group; range 4–84) of which 1157 actices went on to complete the audit (mean 24.1 per audit oup). Groups used a variety of methods to encourage practices participate (Table 2). Only a minority offered reimbursement costs or some form of grant.

nding

rty (83.3%) audits were funded either wholly or in part by dit groups themselves. Seven (14.6%) received funding m the local health authority and four (8.3%) from the ional health authority. One (2.1%) audit received funding m a hospital and one (2.1%) received funding from a armaceutical company.

anning and support

ie responsibility for detailed planning lay mostly with the dit group staff. In 28 (58.3%), leadership was provided imarily by the audit group chairperson. Other clinical ofessionals or managers were rarely involved as leaders but re more likely to have a supporting role. Audit support iff were involved in primary data collection for 12 (25.0%) the audits reviewed, and in undertaking the data analysis t45 (93.8%). In all other cases, practice staff were reported responsible for data collection and analysis.

riteria and standards

ble 3 shows methods used for selecting audit review criteria. any audit groups used a combination of methods for lecting audit criteria. Very few of the audits included in the idy involved a systematic review of available literature. In

16 (33.3%), the audit groups left the practices themselves to decide on setting standards (the percentage of events that should comply with a criterion [14]). The audit group was responsible for setting the standards for 16 (33.3%) and in a further 16 (33.3%) no standards were set.

The audit design

Each group advocated a variety of methods to practices for identifying patients, and several sources of data were used (for example, paper or computer records) for extracting patient information. Standard advice was given to all practices within each audit group including advice on identification of patients using a disease register in 35 multi-practice audits (75%), practice computer in 34 (71%), patient records in 27 (56%), repeat prescribing system in 24 (50%), age–sex register in 16 (33%), and the hospital register in three (6%). Advice on data extraction was standardized for each audit group including the use of patient records in 42 (88%), computer records in 39 (81%) and the hospital records in 10 (50%). Twenty-five (52.1%) groups advised practices to select every patient and 23 (47.9%) advised practices to select a sample of patients. When some form of sampling was undertaken, 52.2% (12/23) of audit groups advised practices to undertake systematic sampling.

Feedback and dissemination

Forty-one (85.4%) groups reported that participating practices received feedback of results in an individualized practice feedback report. These reports were made anonymous to allow the practice to compare their performance against that of their peers. Findings were presented to groups of participating practices in a general meeting in 19 (39.6%), or as part of a more specific educational meeting in 23 (47.9%). Feedback to practices by means of a practice visit by a representative from the audit group was undertaken for seven (14.6%) of the audits. Table 4 shows the methods used to disseminate reports of multi-practice audits.

Table 4 Methods of disseminating audit findings to interested parties

Method of dissemination	Number of audit groups (%)
Audit group newsletter	29 (60)
Audit group annual report	29 (60)
Report to local health authority	21 (44)
Report to non-participating practices	15 (31)
Report to other audit groups	12 (25)
Seminar/workshop	10 (21)
Presentation at regional/national conference	5 (10)
Article in peer review journal	1 (2)

Identifying and implementing change

In 19 (39.6%) audits, the audit group had not undertaken any follow-up action. In 12 (25.0%) the group had made a personal visit to practices, in eight (16.7%) the audit group had requested an action plan from practices and two (4.2%) audits were followed with a telephone call. Table 5 shows the actions the groups had undertaken or were planning to undertake as a result of the audit. Thirty-three (68.8%) audit groups were aware of actions that the practices had undertaken or were planning to undertake as a result of the audit.

Discussion

This survey was designed to investigate the strengths and weaknesses of multi-practice primary care audits of diabetes and asthma being conducted by audit groups in England and Wales. Although the majority of audit groups were conducting

this type of audit, only just over one-half were willing or able to provide details of their audits. Despite concerted efforts to allay fears over the confidentiality of information about the organization of multi-practice audits, this evidently remained a concern for many groups. For other groups, problems were encountered in locating audit reports, particularly if the audit had been completed some time previously or if the staff responsible for the audit were no longer working with the group. The audit groups who responded in this survey were self-selected and may therefore represent groups that have conducted a systematic audit. However, there was no difference in the number of practices in audit groups that responded and those that did not (Mann–Whitney U = 370, $P = 0.87$).

The findings confirm that primary care audit groups have been co-ordinating asthma and diabetes multi-practice audits and were feeding back information to practices on a comparative basis. As a result of this approach, large numbers of practices have been involved in audits of diabetes and asthma care. However, there was considerable variation in the quality of audits.

Half the audits reviewed were reported by audit groups to have completed, or were in the process of completing, a second data collection. Most of the remaining groups reported having plans to complete the audit cycle in the future, but the proportion that will eventually do so remains uncertain. Audit groups should concentrate on finishing the cycle to check that changes have been effective rather than simply facilitating participation and feeding back information to practices.

The study also examined the levels of participation and methods used by audit groups to encourage it. Humphrey et al. [4] concluded that allocating a high priority to audit was difficult for practitioners due to the lack of dedicated time or resources. Bapna et al. [15] also found that high workloads, and inadequate premises and facilities were major barriers to undertaking audit.

Table 5 Actions undertaken/planned by practices

Actions undertaken/planned	Number of audits (%)
Offering to repeat data collection exercise	29 (60.4)
Provision of advice/suggestions/commentary on specific improvements which could be made	24 (50.0)
Discussion with local experts about local policies and interface audit	22 (45.8)
Provision of education programme for GPs or teams	13 (27.1)
Offering visits of a facilitator or specialist nurse or advised about seeking additional funding from the FHSA(HC) to help certain practices	7 (14.6)
Seeking improved provision of nurses or other resources	6 (12.5)
Development of diabetes/asthma patient record card	6 (12.5)
No action undertaken/planned	4 (8.3)
Revision of policy	18 (38)
Introduction of computer record for the clinic	13 (27)
Provision of education programme for GPs and nurses	11 (23)
Introduction of structured record card	11 (23)
Liaison with local experts	10 (21)
Support from other agencies e.g. British Diabetic Association, National Asthma Campaign	6 (13)
Not aware of any actions	15 (31)

The findings from our study showed that some practices were still not participating in multi-practice audits of these two common chronic conditions in primary care. However, some practices may have conducted their own audits and therefore may have decided that participation in a multi-practice audit would have been unnecessary. Around one-third of practices did agree to take part, and even fewer were completing the audit to its first data collection stage. Audit groups need to use effective methods to encourage participation; for example, audit facilitators have been found to successfully introduce practitioners to audit when they have explored the barriers and problems on an individual practice basis [15]. We were unable to determine the effect of levels of funding or incentives on participation. However, a recent study showed that the number of audits per practice is independent of the level of funding of the audit group [16].

Although there are widely recognized recommendations about diabetes and asthma care, many groups were selecting criteria using informal methods. A recent study has shown that there are wide variations in the criteria chosen for audit of diabetes [17]. If audit is to lead to worthwhile improvements in care, the criteria should be based on convincing evidence [4]. The adoption by all audit groups conducting a multi-practice audit of common evidence-based review criteria would also allow audit groups to compare performance with each other in a similar way to practices comparing their performance with peers.

Variations in sampling techniques and sample sizes were also evident. To ensure confidence that an audit is a true measure of performance, adequate and reliable samples are required. It appears that greater awareness about sampling techniques is required among audit groups and their practices.

This study demonstrated that audit groups were feeding back audit results to their practices. It is also encouraging that audit groups were using educational meetings to report audit findings for almost half (48%) of the audits reviewed, although practice visits from audit group members to discuss the results were rare (15%). Few studies have measured the effects of feedback to general practices as a whole, although many have investigated the effects on individual practitioner behaviour. It has been suggested that feedback of information would be more appropriate at practice level in influencing service delivery [18]. One study [19] concluded that feedback strategies using graphical and tabular comparative data are most effective in general practice with about two-thirds of practices reporting organizational change as a consequence. However, although comparative data from peers can be a powerful tool for encouraging positive changes in behaviour, they are not always effective [19]. Feedback may be more likely to influence clinical practice if it is part of an overall strategy which targets decision makers who have already agreed to review their practice [7]. The impact of feedback may be enhanced by an educational exercise or visit from a facilitator [7,20,21]. Therefore, audit groups should use a wider range of strategies to implement change.

This study indicates that multi-practice audits can involve large numbers of practices and provide information about the quality of care. However, efforts are required to improve the quality and effectiveness of these audits. Organizers of multi-practice audits should pay more attention to the selection of criteria, methods of identifying and sampling patients, data collection procedures, and methods for implementing changes in performance. This has implications for the training needs of organizers of multi-practice audits.

Acknowledgements

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Use of multiple methods to determine factors affecting quality of care of patients with diabetes

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Khunti K. Use of multiple methods to determine factors affecting quality of care of patients with diabetes. *Family Practice* 1999; **16**: 489–494.

Background. The process of care of patients with diabetes is complex; however, GPs are playing a greater role in its management. Despite the research evidence, the quality of care of patients with diabetes is variable. In order to improve care, information is required on the obstacles faced by practices in improving care. Qualitative and quantitative methods can be used for formation of hypotheses and the development of survey procedures. However, to date few examples exist in general practice research on the use of multiple methods using both quantitative and qualitative techniques for hypothesis generation.

Objectives. We aimed to determine information on all factors that may be associated with delivery of care to patients with diabetes.

Methods. Factors for consideration on delivery of diabetes care were generated by multiple qualitative methods including brainstorming with health professionals and patients, a focus group and interviews with key informants which included GPs and practice nurses. Audit data showing variations in care of patients with diabetes were used to stimulate the brainstorming session. A systematic literature search focusing on quality of care of patients with diabetes in primary care was also conducted.

Results. Fifty-four potential factors were identified by multiple methods. Twenty (37.0%) were practice-related factors, 14 (25.9%) were patient-related factors and 20 (37.0%) were organizational factors. A combination of brainstorming and the literature review identified 51 (94.4%) factors. Patients did not identify factors in addition to those identified by other methods.

Conclusion. The complexity of delivery of care to patients with diabetes is reflected in the large number of potential factors identified in this study. This study shows the feasibility of using multiple methods for hypothesis generation. Each evaluation method provided unique data which could not otherwise be easily obtained. This study highlights a way of combining various traditional methods in an attempt to overcome the deficiencies and bias that may occur when using a single method. Similar methods can also be used to generate hypotheses for other exploratory research. An important responsibility of health authorities and primary care groups will be to assess the health needs of their local populations. Multiple methods could also be used to identify and commission services to meet these needs.

Keywords. Diabetes mellitus, methodology, qualitative, quantitative.

Introduction

Although the process of care of patients with diabetes is complex, GPs are playing a greater role in its

management. A recent systematic review concluded that computerized central recall, with prompting by GPs, can achieve good standards of care.[1] Unstructured care of patients with diabetes in the community is associated with poorer follow-up, greater mortality and worse glycaemic control in comparison with hospital care.[1] Despite the research evidence, the level of performance in primary care can be variable.[2,3]

In order to improve care, information is needed about the characteristics of practices that offer different levels of care, and the obstacles faced by practices in improving care. Knowledge of factors that influence quality of care

in diabetes may therefore be helpful in implementing quality improvement programmes. Qualitative and quantitative methods can be used for formation of hypotheses and the development of survey procedures. To date, few examples exist in general practice research on how these methods can be used for hypothesis generation. In order to gather information on all factors that may be related to good quality care of patients with diabetes, information from as many sources as possible is required to improve the knowledge on the subject. The opportunity of investigating these methodological issues arose as part of a study investigating factors associated with quality of care of patients with diabetes in primary care. Hypotheses had to be formulated to study the potential factors that may be associated with good quality of care. The aim of this paper is to describe how multiple methods were used for hypothesis generation of potential factors associated with delivery of care to patients with diabetes. The effectiveness of individual methods in generating hypotheses is also discussed.

Method

The proposed study is being conducted in primary care comprising over 300 general practices with over 1000 GPs from three different Health Authorities in England.

Hypothesis generation
A great deal of attention has recently been given to the potential value of qualitative methods of research in health care.[4] A qualitative approach was therefore determined to be necessary for generating hypotheses on factors associated with good quality care of patients with diabetes. Factors for consideration in management of diabetes were generated by multiple methods: literature review, followed by brainstorming, then focus group and then key informant technique with GPs and practice nurses. National primary care audit data on the process of diabetes care were presented to participants in the brainstorming session. The qualitative sessions of brainstorming, focus group and key informant techniques were used only for identifying potential factors that may be related to delivery of quality diabetes care. As these methods were used only to generate a list of factors relating to quality of care, these sessions were not transcribed for detailed thematic analysis. All qualitative sessions were facilitated by the author of this article, and data were recorded on standard recording sheets which were entered into a spreadsheet.

Literature review
A systematic search focused on quality of care of patients in primary care with diabetes was conducted. The search was conducted using Medline, including years 1987–1997 and confined to studies involving

humans and published in English. In view of the large number of articles, and the time and resources available, Medline searches were conducted only on medical subject headings and free text using the following terms: diabetes, quality of care, process and outcome of care. The references were sifted on the basis of article titles only. The retrieved papers were assessed to determine previous research evidence of factors associated with good quality care of diabetes. Cross-referencing from articles identified further studies for consideration. Factors that may influence the quality of care of patients with diabetes were identified from the retrieved articles.[1,5–23] The literature review identified many articles that reported similar factors relating to good diabetic care. Only key articles have been referenced for this study. The literature searching, retrieval and assessment of the papers required approximately 16 hours of work.

Brainstorming
Brainstorming sessions, if conducted properly, may offer many advantages and are a quick means of focusing attention on possible solutions for problems.[24] Because of their interactions with each other, several people in a group setting, by building upon each other's contributions, will be able to generate more ideas about a subject than could the individuals by themselves.[24] The individuals in the group must have a comfortable level of trust with each other and sufficient time for the session must be allowed. The brainstorming session was conducted in a University Department of General Practice and lasted 30 minutes. There were 15 participants, which included academic GPs and research staff. One member of the research staff had diabetes. Prior to the brainstorming, participants were presented with audit data relating to the care of diabetes in 17 Health Authorities in England and Wales.[3] The audit had shown deficiencies in care and wide variations in the process of care of people with diabetes.[3]

Focus groups
Focus groups enhance the validity of existing questionnaire by highlighting those concerns held by users and providers that would otherwise be neglected.[25] Although brainstorming is a rapid and convenient way of collecting information from several sources simultaneously, focus groups explicitly use group interaction as part of the method.[26] Focus groups can permit formulation of new hypotheses and inform further study.[27] This method allowed more detailed information to be obtained including themes identified by brainstorming. One focus group was held and included two diabetic consultants, an epidemiologist with an interest in diabetes, a practice nurse with an interest in diabetes and a public health consultant. This session lasted 25 minutes. Specific factors that may contribute to good and for quality of care were identified.

The key informant technique

The key informant technique is a qualitative research method where an expert source of information is asked to provide deeper insight into what is going on around them.[28] The aim of this part was to interview key people currently delivering care to patients with diabetes in primary care. The key informants included two practice nurses who ran diabetic clinics and two GPs with experience in providing care to patients with diabetes. Some factors identified by the literature review, brainstorming and the focus groups were explored in more detail, with key members responsible for delivering diabetes care in general practice. Face-to-face interviews lasted 20–30 minutes.

Patients

Consulting the public is an important component of commissioning health services and it has been suggested that health care workers wanting to know the values people attach to health services should adopt qualitative approaches.[29] There is increasing interest in incorporating lay perspectives, especially people with experience of the disorder, in health services research with the potential to influence the research priorities and identification of problems.[30] The importance of incorporating quality assurance and the needs and perspectives of people with diabetes has been well recognized.[31,32] Factors relating to quality care of patients with diabetes for patients was obtained by brainstorming at a meeting of the local branch of the British Diabetic Association (BDA). Attendees at the BDA meeting included patients with both insulin and non-insulin-dependent diabetes and their carers.

TABLE 1 *Practice factors that may be associated with quality of diabetes care*

	Method of identification
Partner/s with an interest in diabetes	a, b, c, e
General practice diabetes education	a, b, c
Vocationally trained doctors	a
Practice nurse with an interest in diabetes	a, b, c, e
Young partners	a, b, c
Training practice	a, b, c
Teaching practice	b, c
Practice size (number of patients)	a, b
Number of partners	b, c, d
Number of practice nurses	a, b, c, d
Practice manager	a, b
Appointment system	b
Personal list	b
Computerized practice	a, b, c, d
Attachment of a practice manager	b
Practice workload	a, b, c, d
Fundholding	c
Teamwork in practice	c
Practice motivation	a, b, c, d
Type of consultation	a, b

[a] Literature review.
[b] Brainstorming.
[c] Key informant technique.
[d] Focus group.
[e] Patients.

Results

A wide range of potential factors were identified. The five methods identified 54 potential factors that may be related to good diabetic care. Twenty (37.0%) were practice-related factors (Table 1), 20 (37.0%) were organizational factors (Table 2) and 14 (25.9%) were patient-related factors (Table 3). Brainstorming identified 89.2% (33/37) of the factors identified by the literature review. Table 4 shows the proportion of potential factors identified by each of the five methods and the yield of combining different methods. Only 5.6% (3/54) of factors were identified by all five methods.

There was overlap of factors identified by the various methods; however, the focus group and the key informants identified specific and detailed enablers and obstacles to quality diabetes care. For example, in the brainstorming session, availability of individual members of the diabetes team were identified as broad themes. However, the key informants found that teamwork among these individuals was also essential for high-quality care. Although only a few factors were identified

by patients and carers, they were generally very critical of the care received in primary care. During the session with patients, it was apparent that they felt that easy access to a primary care diabetes service and delivery of care by individuals who were interested in diabetes was essential for good quality care.

Discussion

The proportion of patients with diabetes being reviewed in general practice has increased since 1990,[33] but the level of care is variable.[2,3] A potential explanation is that the delivery of care to patients with diabetes is complex, with many factors influencing the care.[5] Previous research by Pringle and colleagues has shown that only a few factors out of 25 potential factors explained a small proportion of variation in diabetes care.[5] The present study found a further 29 factors, of which only 12 factors have been reported in the literature. The complexity of

TABLE 2   *Organizational factors that may be associated with quality of diabetes care*

	Method of identification
Presence of a diabetic register	a, b, c, d
Presence of a recall system	a, b, c, d
Structured care in a diabetic clinic	a, b, c, d, e
Special arrangements to see diabetic patients	b, e
Attachment of a diabetes nurse/health visitor	a, b, c, d
Access to a chiropodist	a, b, c, d, e
Access to an optician/optometrist	a, b, c, e
Access to a dietician	a, b, c, d, e
Presence of a glucometer	a, b, c
Approved for chronic disease management	a, b
Proportion of patients self-monitoring	a, b, c, e
Prevalence of diabetes	b, d
Good local secondary care diabetic services	a, b, d
GP diabetes education	a, b, c, e
Practice nurse diabetic education	b, c, d
Involved in diabetes audit/quality assurance programme	a, b
Presence of diabetes protocol/guideline	a, b, c, d
Development of practice protocol/guideline	b, d
Presence of decision support system	a
Introduction of change as a result of audit	b

For key, see footnote to Table 1.

TABLE 3   *Patient factors that may be associated with quality of diabetes care*

	Method of identification
Patient education	a, b
Sex of patient	a
Psychological factors	a
Type of treatment	a, b
Type of diabetes	a, b, d
Patient self-monitoring diabetes care	a, b, c, e
Length of illness	a
Mobile population	b
Frequency of attendance	a, b, c, e
Deprived patients	a, b, c, d
Unemployed patients	b, d
Elderly patients	b, d
Patients with chronic illness	b
Ethnicity	c, d

delivery of care to people with diabetes is therefore reflected in the large number of potential factors identified in this study.

The methods in this study were used to identify themes rather than produce a list of specific interventions that may be related to good quality diabetes care. A qualitative approach was employed for generating the hypotheses given the exploratory nature of the study. Qualitative techniques offer an alternative approach especially to identify how people feel about the services they deliver or receive and to explore issues in greater depth.

Implications

A questionnaire study can be designed to identify potential factors related to quality care in diabetes; however, these surveys depend on response rates which have been low in recent surveys.[34] Multiple methods can therefore be useful for obtaining a variety of information on the same issue and to overcome the deficiencies of single-method studies.

A comprehensive literature review is important in early stages of planning any research study. Qualitative methods were used to explore additional factors from users and providers of diabetes care. Furthermore, quantitative data, such as audit data, can be used to stimulate hypothesis generation. Literature searching and brainstorming were the most effective methods of identifying the potential factors and together identified nearly 95% of the factors. The combination of literature searching and brainstorming may be an acceptable alternative for hypothesis generation, and other researchers may wish to adopt this pragmatic approach if there are limitations on time or resources. Although there is increasing interest in incorporating lay perspectives in health services research and in exploration of barriers to effective care,[35] in this study the patients or their carers did not identify factors in addition to those identified by other methods.

Findings from such analyses can support the relevance and identification of factors. It has been recognized that for health care evaluation, a wide range of research methods is warranted.[36] Each evaluation method provides unique data. Although multiple methods are common in nursing[37] and social science research,[38] there are only a few published general practice studies that have reported similar methods in the UK. These have been used in rapid appraisal for planning primary care services.[39,40]

Varying approaches for hypothesis generation lead to identification of different aspects for the same topic, leading to completeness. This study shows the feasibility of linking qualitative and quantitative methods for hypothesis generation. The study also demonstrates how the exploration of related factors (practice, organization of care and patient) not addressed by a single method may be aided by multiple methods. Thus, multiple methods

TABLE 4 *Number (%) of potential factors that may affect quality of care of patients with diabetes identified by multiple methods*

	Literature review (a)	Brainstorming (b)	Key informant technique (c)	Focus group (d)	Patients (e)	Combination of a–b	Combination of b+c
Practice factors (20)	13 (65.0)	17 (85.0)	13 (65.0)	5 (25.0)	2 (10.0)	18 (90.0)	19 (95.0)
Organizational factors (20)	15 (75.0)	19 (95.0)	12 (60.0)	11 (55.0)	7 (35.0)	20 (100.0)	19 (95.0)
Patient factors (14)	9 (64.3)	10 (71.4)	4 (28.6)	5 (35.7)	2 (14.3)	13 (92.9)	11 (78.6)
Total (54)	37 (68.5)	46 (85.2)	29 (53.7)	21 (38.9)	11 (20.4)	51 (94.4)	49 (90.7)

enable a complete picture which may have been missed if only one approach had been applied. A major strength of using these qualitative methods is the proximity of the researcher to key members responsible for delivering care: users of services provide greater insight into the topic being researched. Qualitative methods therefore allow more personalized insight into those involved in delivery of services. Furthermore, involvement of all key stakeholders, including patients clinicians and policy makers, minimizes risk of unrepresentative sampling. The multiple methods used are complementary, especially the literature review and the brainstorming which guided further in-depth analysis of enablers and barriers in the focus group and key informant sessions. The list of potential factors generated can also be used by other researchers.

Limitations

Several problems are, however, inherent in using multiple methods for hypothesis generation. Major barriers to conducting such multiple methods include time and cost and skills of the researcher. The literature search required a substantial amount of time (approximately 16 hours). Brainstorming, key informant technique and focus groups required an additional 3 hours. However, this does not include the time required of the participants and for arranging the meetings. Furthermore, for research purposes the list of potential factors identified by these methods may be so large that it would be difficult to test all these factors in one study. In addition, this present study did not attempt to prioritize the identified factors on the basis of importance.

There are other difficulties in using multiple methods in research because of its complexity. Use of multiple methods also requires careful planning. The researcher may have limited methodological training that may be limited in certain areas. The researcher also needs to be aware of the strengths and weaknesses of each method. This method also relies on the description and interpretation by the researcher. Furthermore, the research question needs to be clearly focused for participants. In addition, combining and interpretation of data obtained by multiple methods can be difficult.

Conclusions

This study has shown that multiple methods can be a useful tool in exploratory research in primary care. A broad range of issues relating to care of patients with diabetes in primary care have been identified. The factors emerging from this work confirm some hypotheses derived from previous research and suggest new ones for exploration. This study has developed a way of combining various traditional methods in an attempt to overcome the deficiencies and bias that may occur when using a single method. Similar methods can therefore be used to generate hypotheses for other exploratory research. Furthermore, multiple methods may also be useful for health authorities and primary care groups to assess the health needs of their local populations and to commission services to meet these needs.[41] The next stage of the study will explore the relationship between some of the identified factors and the quality of care of patients with diabetes. Some of these factors have been identified in the literature and other new ones identified by qualitative methods. Further research needs to be conducted on how patients can be used in identifying factors relating to good quality care (primary and secondary) and on issues of priority setting.

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Who looks after people with diabetes: primary or secondary care?

Kamlesh Khunti FRCGP   Sumita Ganguli PhD

PRACTICE

SUMMARY

Because the prevalence of type 2 diabetes has increased greatly over the past decade, UK general practitioners have been encouraged to develop services for people with diabetes and to offer structured diabetes care. The resultant shift from secondary care can place considerable demands on primary health care teams. Data were obtained from 108 practices in two English health districts followed up in primary and secondary care.

Nearly two-thirds of the people with diabetes were being followed up only in general practice, the remainder in hospital or both. The proportion managed in primary care varied from 5.6% to 94.6%. The settings where diabetes care was most likely to be offered were training practices, practices with good nursing support, practices with a high prevalence of diabetes, and practices in which a high proportion of diabetic patients were controlled by diet or hypoglycaemic agents.

Tight control of glycaemia and blood pressure is now seen as important in diabetes, and is best achieved in general practice. This survey revealed large variations in delivery of general-practice diabetes care that need to be addressed by better organization and funding.

INTRODUCTION

The nature of work undertaken by different health professionals is constantly shifting[1] and for the past 15–20 years diabetes has been argued as a disease suitable for follow-up in primary care[2]. In addition, the prevalence of type 2 diabetes has increased dramatically over the past decade[3]. General practitioners have therefore been encouraged, since 1993, to develop services for diabetes, with a specific payment for doctors offering structured diabetes care. As a result, the proportion of people with diabetes reviewed annually in primary care has increased[4]— a change that seems to be welcomed by the patients[5]. Such a shift can place considerable demands on primary health care teams, but there is evidence that structured care in general practice can be of high standard[6]. However, little is known about the proportion of people with diabetes being cared for in the primary and secondary sectors. The aim of this study was to estimate the proportions of people with diabetes managed solely in primary care or secondary care. Our further aim was to determine associations of general-practice care with practice characteristics and with the prevalence and treatment of diabetes.

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METHOD

We obtained data from two primary care audit groups (formally called medical audit advisory groups) that had recently conducted a multipractice audit of diabetes care. Practices in these audit groups had audited diabetes care between 1994 and 1996, after instruction on how to develop an accurate diabetes register. The methods included a disease register, computer records, hospital registers and repeat prescriptions[7]. The practices were asked to supply information on where the patients received their diabetes care. The patients were classified as being followed up in general practice only (GP care), hospital clinics only (hospital care) or both (shared care). Since the taxonomy of shared care is not fully developed[6], we studied variations in patients solely under general practice care. We did not determine whether the patients were reviewed annually at general practices or hospital clinics since data on this question have been reported[4].

The respective health authorities provided data relating to 1996 for all the general practices including list size, number of partners, fundholding status, Jarman Score, Townsend Score, training status and number of whole-time-equivalent nurses. Data for two deprivation measures were collected because the Jarman Score[8] is currently used for deprivation payments but the Townsend Score[9] is closely related to material deprivation. Ethical approval was granted from both local ethics committees and respondents were promised confidentiality.

Table 1 Delivery of care of people with diabetes*

Site of care	No. (%)	95% confidence interval	Range between practices
GP	6041 (63.2)	62.2 to 64.2	5.6 to 94.6
Hospital	1184 (12.4)	11.7 to 13.1	0 to 69.4
Shared	2332 (24.4)	23.5 to 25.3	0 to 88.0

*Data on delivery of care not known for 339 (3.4%) patients

Data were analysed with SPSS for Windows (version 8). Univariate associations between variables were sought by standard chi-squared test for categorical variables and *t*-tests for continuous variables. Multiple regression was employed to determine which practice characteristics were independently associated with general-practice care.

RESULTS

The two health authorities were responsible for 239 practices of which 123 had participated in the multipractice audit. There was no significant difference in mean list size, number of GPs, number of whole-time equivalent nurses, Jarman Score, Townsend Score, fundholding status or training status between those practices that participated in the multipractice audit and those that did not. Data on the delivery of care were available for 9896 people with

diabetes from 108 (87.8%) practices of which 27 (25.0%) were single-handed, 70 (64.8%) had 2–5 partners and 11 (10.2%) had 6 or more partners. Table 1 shows where people with diabetes received their care. Treatment was known for 9800 (99.0%) people with diabetes: 7170 (73.2%; 95% confidence interval 72.3 to 74.1) were on diet or oral hypoglycaemic drugs and 2630 (26.8%; 26.0 to 27.7) were insulin treated. Figure 1 shows a frequency histogram of proportions of patients under general-practice care.

Table 2 shows the univariate and multiple linear regression of factors associated with the likelihood of provision of care from general practice. Increased delivery of care in general practice is significantly associated with training practices, practices with more nurses, practices with a higher prevalence of diabetes and practices with a higher proportion of patients who are controlled on diet or oral hypoglycaemic drugs. There was no association with fundholding, size of practice, number of partners or socioeconomic deprivation.

DISCUSSION

Can the results of this survey, showing large variations in delivery of diabetes care, be generalized? For accuracy, case ascertainments should be as complete as possible. In this investigation, all available sources were used to develop a diabetes register and all patients were included for the prevalence estimation. Furthermore, the prevalence of
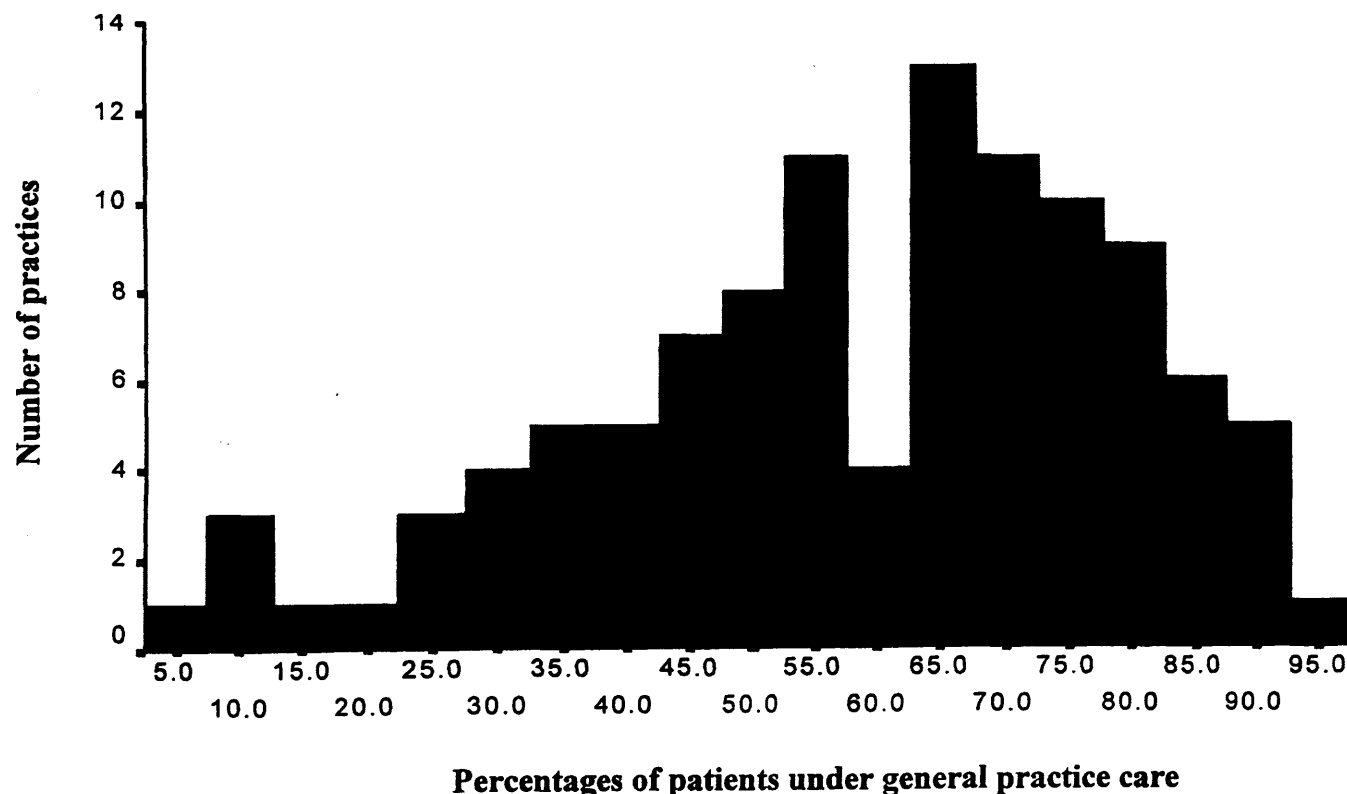
Percentages of patients under general practice care

Figure 1 Frequency histogram of proportion of people with diabetes under general practice care

Table 2 Univariate and multiple linear regression of factors associated with primary care delivery of diabetes in 108 practices

		Univariate regression		Multiple regression[*]	
		Beta-coefficient (95% CI)	P	Beta coefficient (95% CI)P	
Fundholding practice, No. (%)	38 (35.2)	6.9 (−1.2 to 15.1)	0.09	—	—
Training practice, No. (%)	19 (17.6)	17.2 (7.4 to 27.0)	0.0007	14.8 (6.4 to 23.2)	0.001
List size in 1000s	6.0 (6.7)	0.4 (−0.6 to 1.4)	0.40	—	—
No. of GPs	3.2 (3.6)	2.0 (0.1 to 3.9)	0.04	—	—
No. of whole-time equivalent nurses	1.4 (2.1)	4.2 (0.3 to 8.1)	0.04	4.4 (1.1 to 7.6)	0.009
Mean Jarman Score[†]	3.9 (6.4)	−0.1 (−0.4 to −0.1)	0.35	—	—
Mean Townsend Score[†]	0.4 (1.0)	−0.8 (−2.0 to 0.5)	0.23	—	—
Mean prevalence of diabetes, %	1.6 (0.7)	11.1 (6.1 to 16.1)	<0.0001	8.1 (3.6 to 12.7)	0.001
Proportion of patients diet controlled or on oral hypoglycaemic drugs, %	73.2 (12.7)	0.5 (0.2 to 0.8)	0.001	0.4 (0.2 to 0.7)	0.001

Values are mean [SD] unless stated otherwise
[†] 1991 enumeration district data
[*] Four factors were independently associated with primary care delivery of diabetes (adjusted R^2 32.9%)

known diabetes, 1.6%, was similar to rates found in other recent studies[3]. The proportions of patients being cared for in general practice, hospital, and shared care are comparable with those in smaller studies of people with diabetes[10–12], and the proportions treated by diet, hypoglycaemic drugs and insulin are also comparable to those previously reported[7]. What about selection? Although the practices that took part were self selected, they were typical of practices in England in terms of number of partners, list size and fundholding status[13]. Training practices were marginally under-represented.

Despite the evidence that general-practice care can be as good as hospital care, the wide variations exposed in this survey clearly need to be addressed. A major obstacle to comprehensive and systematic diabetes care in general practice is lack of 'organization': delivery of diabetes care in general practice is associated with more organized practices, a higher level of nursing support and a higher prevalence of diabetes in the practice population. Deprivation does not seem to be an obstacle. Because we did not determine the quality of care delivered by the practices, we cannot say whether practices with a high proportion of people with diabetes under general-practice care were providing good or poor services. A recent large study of multipractice audit data indicated that 85% of people with diabetes were reviewed annually[14].

The UK Prospective Diabetes Study Group has lately shown the importance of tight glycaemic[15] and blood pressure[16] control in diabetes. Action based on this evidence is best served in primary care, but this will place a heavy burden on already stretched primary-care diabetes

teams. Furthermore, if there is an increase in transfer of patients from secondary care to primary care it is important to ensure that primary care is adequately resourced to provide high quality of care[4].

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Clinical governance for diabetes in primary care: use of practice guidelines and participation in multi-practice audit

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SUMMARY

Background. Diabetes is one of the most common chronic diseases managed in primary care but there are large variations in the quality of care. Reducing inequalities by improving clinical effectiveness when necessary is therefore a priority for the National Health Service. Implementation of guidelines and participation in multi-practice audit have been shown to improve the care of patients with diabetes, and guidelines and audit are key elements of the clinical governance framework.

Aim. To determine factors associated with use of guidelines and participation in audit of diabetes in primary care.

Method. A postal questionnaire sent to all general practitioners (GPs) in three health districts in England. The primary care audit groups provided data on all practices that had participated in a multi-practice audit of diabetes. The health authorities provided data about practice characteristics including list size, number of partners, fundholding status, Jarman score, Townsend score, training status, and number of nurses.

Results. Response rate was 81% (264 practices and 987 GPs). Two hundred and forty-three (92%) practices had a diabetes guideline or protocol and 169 (51.7%) practices had taken part in a multi-practice audit of diabetes. The source of the guideline/protocol included a practice-developed guideline in 168 (70.7%) practices and a nationally developed guideline in 48 (20.1%) practices. However, the guideline had been implemented more than three years ago by 73.9% (176/238) of practices. Multiple logistic regression showed that implementation of guidelines/protocols was independently associated with list size (per 1000) (OR = 1.2, 95% CI = 1 to 1.4, P<0.02) and participation in audit was independently associated with the Townsend score (OR = 0.9, 95% CI = 0.8 to 1, P<0.05).

Conclusion. Elements of clinical governance programmes are less likely to be implemented in smaller practices and in socioeconomically deprived areas. Recent studies have confirmed the existence of an inverse socioeconomic mortality gradient in people with diabetes. Our study shows that practices with the greatest need are less likely to be involved in clinical effectiveness programmes. The results will be important to those responsible for implementation of clinical governance within primary care.

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Introduction

IMPLEMENTATION of guidelines[1] and participation in multi-practice audit[2] have been shown to improve the care of people with diabetes. However, despite evidence about the effectiveness of treatment, care is variable and sometimes poor.[3] Therefore, reducing inequalities by implementing clinical effectiveness programmes is a priority for the National Health Service (NHS).[4,5] Key elements of clinical effectiveness programmes include evidence-based clinical guidelines and clinical audit. In *A First Class Service*, the National Institute for Clinical Excellence provides national guidelines, with clinical governance as the mechanism for local implementation.[5] Clinical governance is described as 'a framework through which NHS organisations are accountable for continually improving the quality of their service and safeguarding high standards of care by creating an environment in which excellence in clinical care will flourish'.[5] Audit will be a principal component of clinical governance, having a role in both implementation and monitoring of effectiveness.

General practitioners (GPs) are broadly positive about the effectiveness and benefits of guidelines and some already produce guidelines in their own practices.[6] There has also been an increase in the number of practices taking part in multi-practice audits of diabetes.[2] Primary care audit groups (formally known as medical audit advisory groups or MAAGs)[7] have been instrumental in encouraging practice participation in audit, with diabetes being the most common topic for a multi-practice audit.[8] Despite these developments, many practices still do not have guidelines and do not participate in audit. This may account for some of the variations in care offered to people with diabetes.[3] GPs' attitudes and behaviour relating to guidelines[6] and practice barriers to audit have been described previously.[9,10] However, these surveys were not concerned specifically with diabetes.

There may be many complex reasons why practices do not use guidelines or participate in audit. A better understanding of practice characteristics and organisational issues that influence use of diabetes guidelines and participation in diabetes audit would help to indicate where resources and effort should be targeted to encourage practices to undertake systematic clinical effectiveness programmes for diabetes. The opportunity to investigate the use of guidelines and participation in audit arose as part of a larger study investigating factors associated with quality of care of people with diabetes in primary care. The aim of this study was to determine the current level of use of guidelines and participation in audit of diabetes in primary care. A further aim was to identify practice factors associated with implementation of clinical effectiveness programmes in general practice.

Method

Identification of practices that had conducted a multi-practice audit

A list of audit groups that had conducted a multi-practice audit of

diabetes care between 1994 and 1996 was available from a recent study.[3] Three audit groups (Leicestershire, Durham, and Suffolk) were selected for the main study because they had conducted a systematic multi-practice audit of people with diabetes using evidence-based criteria.[11] These audit groups had supported their practices in developing a diabetes register using multiple sources and helped with standard data collection, analysis, and feedback.

Data relating to practices

The three health authorities provided data about practice characteristics relating to 1996 for all general practices, including list size, number of partners, fundholding status, Jarman score, Townsend score, training status, and the number of whole time equivalent (WTE) nurses. Data for two deprivation measures were collected because the Jarman score[12] is currently used for deprivation payments whereas the Townsend score[13] is closely related to material deprivation. For two health authorities, the Jarman Score was calculated at electoral district level and for one it was calculated at ward level.

Questionnaire development

A self-administered questionnaire consisting of 20 questions was developed and piloted in eight practices. Following the pilot, a small number of minor alterations were made to the wording of the questionnaire. The questionnaire sought details of the organisation of care for patients with diabetes. Details were also obtained on the presence of a practice guideline or a protocol and their development. 'Practice guideline' and 'protocol' were not defined in the questionnaire and it was therefore left for the responders to decide. Most questions required closed-ended responses. The questionnaire was sent in 1997 to all practices in the three health authorities. It was addressed to the practice nurse or the practice manager with instructions that information for answering some of the questions should be obtained from the GP in the practice. Non-responders were sent a reminder letter after three weeks and then telephoned. Responders were assured of confidentiality. Ethical approval was granted from all three local research ethics committees.

Data collection and analysis

Data were analysed using SPSS for Windows version 8. All questionnaires were entered twice by SG and a 20% of data entry sample was validated by KK. Associations between variables were sought using chi-squared tests and unpaired t-tests for comparison of means. Odds ratios were calculated for univariate variables. Multiple logistic regression was employed to determine which factors were independently associated, in a multivariate analysis, with either having a practice diabetes guideline/protocol, taking part in audit or both as dependent variables. Variables were included if there was a significant association in univariate analysis at a significance level of 0.05 or if they were likely confounders. Explanatory variables were tested in a forward stepwise regression analysis.

Results

The three authorities were responsible for 327 practices (mean = 109, range = 87 to 152) with over 1150 GPs. The mean number of GPs per practice was 3.6 (range between health authorities = 3.4 to 4.1), proportion of patients over 65 years was 15.8% (range = 14.2% to 18%), Townsend score was 0.7 (range = 0.54 to 0.85), and the Jarman score was 3.8 (range = -0.1 to 5.3).

Questionnaire response

Two hundred and sixty-four practices comprising 987 GPs responded (mean practice response rate = 80.7%, range between health authorities = 70.1% to 90.8%). Two practices refused to participate and 61 failed to reply. The responding practices were significantly larger than non-responding practices (mean number of GPs = 3.7 versus 3.1, $P = 0.013$). Practices with three or more partners had a significantly higher response rate than those with one or two partners (84.4% versus 74.4%, $\chi^2 = 4.8$, $P<0.05$). There was no significant difference in mean list size, fundholding status, average age of GPs, computerisation, WTE practice nurses, training status, Jarman score or Townsend score between responders and non-responders.

Practice guidelines or protocols

Of the responders, 243 (92%, range between health authorities = 88.3% to 96.9%) practices had a practice guideline or a protocol for the management of people with diabetes. Of the practices with a guideline or a protocol, 6.3% (15/238) had implemented the guideline within the past year, 19.7% (47/238) within one to three years ago, and 73.9% (176/238) more than three years ago. Table 1 shows the source of guideline or protocol used in practice. All 65 responding training practices had a guideline. Table 2 shows the individuals involved in development for practices that developed their own practice guideline/protocol. Table 3 shows the univariate analysis of factors associated with practices having a guideline or a protocol. Multiple logistic regression showed that presence of a practice guideline or protocol was independently associated with list size (per 1000) (OR = 1.2, 95% CI = 1.0 to 1.4, $P<0.02$).

Participation in multi-practice audit

One hundred and sixty-nine (51.7%, range between health authorities = 44.1% to 64.4%) practices had taken part in a primary care audit group-led multi-practice audit of diabetes. Table 4 shows the univariate analysis of factors associated with participation in a multi-practice audit. Multiple logistic regression showed that participation in multi-practice audit was independently associated with the Townsend score (OR = 0.9, 95% CI = 0.8 to 1.0, $P<0.05$).

Table 1. Source of diabetes guideline or protocol used in practice ($n = 239$).[a]

Guideline	Number (%)
Practice-developed	168 (70.7)
Locally developed	60 (25.1)
Nationally developed	48 (20.1)
Primary care audit group-developed	40 (16.7)
Pharmaceutical	1 (0.4)

[a]Some practices had multiple guideline/protocols. These categories were precoded with a space for free text.

Table 2. Method of practice-developed guideline ($n = 168$).

Method	Number (%)
Consultation with practice doctors	148 (88.1)
Consultation with local diabetes specialists	49 (29.2)
Consultation with practice nurses	14 (8.3)
Consultation with other local GPs	8 (4.8)
Consultation with patients	6 (3.6)
Consultation with the health authority	2 (1.2)

Table 3. Univariate analysis of factors associated with having a practice guideline for diabetes.

	Yes (n = 243)	No (n = 21)	Odds ratio (95% CI)
Mean list size in 1000s (SD)	7.1 (4.5)	4.6 (3.3)	1.2 (1–1.4)[a,c]
Mean number of partners (SD)	3.8 (2.3)	3 (1.9)	1.2 (1–1.5)[b]
Mean whole time equivalent nurse (SD)	1.9 (2)	1.8 (2.2)	1 (0.8–1.3)[b]
Mean Jarman score (SD)	3.2 (3.5)	9.1 (20.2)	1 (0.9–1)[b]
Mean Townsend index (SD)	0.6 (2.9)	1.9 (4.4)	0.9 (0.8–1)[b]
Fundholding practice (%)	89 (36.6)	4 (19)	2.5 (0.8–7.5)
Partner with an interest in diabetes (%)	167/238 (70.2)	8/20 (40)	3.5 (1.4–9)[d]
Partner attended diabetes course (%)	153/210 (72.9)	9/18 (50)	2.4 (0.9–6.4)
Nurse with an interest in diabetes (%)	211 (86.8)	15 (71.4)	2.6 (1–7.3)
Nurse attended diabetes course (%)	210 (86.4)	15 (71.4)	2.7 (1– 7.5)

[a]Odds ratio for an additional 1000 patients; [b]odds ratio for unit increase; [c]$P<0.05$; [d]$P<0.01$.

Table 4. Univariate analysis of factors associated with taking part in multi-practice audit of diabetes.

	Yes (n = 169)	No (n = 158)	Odds ratio (95% CI)
Mean list size in 1000s (SD)	7 (4.6)	6.3 (3.9)	1 (1–1.1)[a]
Mean number of partners (SD)	3.8 (2.3)	3.4 (2.1)	1.1 (1–1.2)[b]
Mean whole time equivalent nurse (SD)	1.8 (2.2)	1.7 (1.3)	1 (0.9–1.2)[b]
Mean Jarman score (SD)	2.4 (13.3)	5.4 (14.7)	1 (1–1)[b]
Mean Townsend index (SD)	0.4 (2.9)	1.1 (3.2)	0.9 (0.9–1)[b,c]
Fundholding status (%)	59 (34.9)	51 (32.3)	1 (0.7–1.5)
Training practice (%)	44 (26)	35 (22.2)	1.2 (0.7–2)
Practice with a diabetes register present (%)	141/142 (99.3)	110/122 (90.2)	15.4 (2–120.8)[d]
Partner with an interest in diabetes (%)	104/141 (75.2)	69/117 (59)	2.1 (1.2–3.6)
Partner attended diabetes course (%)	97/128 (75.8)	65/106 (61.3)	2 (1.1–3.5)[c]
Nurse with an interest in diabetes (%)	123/142 (86.6)	103/122 (84.4)	1.2 (0.6–2.4)
Nurse attended diabetes course (%)	121/141 (85.8)	104/121 (86)	1 (0.5–2)

[a]Odds ratio for an additional 1000 patients; [b]odds ratio for unit increase; [c]$P<0.05$; [d]$P<0.01$.

Use of guidelines/protocols and participation in multi-practice audit

One hundred and thirty-six (51.5%) practices had both a diabetes guideline/protocol and had participated in a multi-practice audit of diabetes. Fifteen (4.6%) practices neither possessed a diabetes guideline/protocol nor participated in a multi-practice audit. Multiple regression showed that both participation in audit and having a guideline protocol in practice were independently associated with having a partner with an interest in diabetes (OR = 1.9, 95% CI = 1.1 to 3.3, $P<0.02$) and the Townsend score (OR = 0.9, 95% CI = 0.8 to 1.0, $P<0.02$).

Discussion

Delivery of care to people with diabetes is complex and many GPs encounter problems in caring for people with diabetes.[14] An integrated diabetes annual review is suitable for the long-term care of large numbers of diabetic patients.[15] Guidelines for conducting this annual review[16,17] and evidence-based audit protocols[11,18] for assessing the level of compliance with the guidelines are available. Clinical governance is a recent concept for improving quality of care of patients in primary care. To our knowledge, this is the largest study to investigate the key components of clinical governance for diabetes in three geographically different health authorities. This survey shows that most practices have a practice guideline or protocol for management of patients with diabetes and just over half have taken part in multi-practice audits. There are clear differences between those practices that participate in clinical effectiveness programmes or activities and those that do not.

Limitations of the study

The response rate of over 80% is excellent for a general practice questionnaire survey, however there are some limitations to this study. The practices that responded were generally representative except that the response rate was higher for larger practices. Larger practices tend to be more developed[19] in terms of practice organisation and staffing. The results may therefore overestimate the use of guidelines and audit in primary care. Furthermore, some of the responses to the questionnaire were self-reported; for example, interest in diabetes. A further reservation is that the primary care audit groups that are responsible for these three regions are proactive and have close working links with the local health authorities and GPs. These practices were therefore already involved in clinical effectiveness programmes.

Development and use of guidelines or protocols

Recent studies have confirmed that clinical guidelines, if appropriately implemented, can bring about improvements in both process and outcome of care including diabetes care.[1,20] In agreement with a previous study of Lincolnshire GPs,[6] nearly three-quarters of practices in our study had been involved in developing their own ('in-house') practice guidelines for diabetes. However, guidelines are more likely to be valid if developed by a multi-disciplinary group with representatives of all key disciplines.[20] Practice nurses, for example, play a key role in systematic care of people with diabetes but our survey shows that very few guidelines were developed in consultation with practice nurses.

Even though the development of valid guidelines requires high levels of expertise and resources,[20,21] many practices are developing their own practice guidelines or protocols. These practices

are unlikely to have the expertise or resources required and should be encouraged to use well developed local or national guidelines or be offered training to adapt nationally developed guidelines or protocols.[22] Furthermore. most guidelines (73.9%) were implemented more than three years previously. Guidelines must be updated regularly or in the light of significant new evidence. The use of guidelines does not automatically bring about improvements in care since their effectiveness depends on the strategies chosen to implement them.[20] We did not evaluate the recommendations of the guidelines or the specific implementation strategies used in individual practices.

Participation in audit

In primary care, clinical audit is not compulsory, although medical audit advisory groups were set up to support practices participating in audit.[7] Despite audit being promoted in general practice for the past eight years, our survey shows that only half of all practices are taking part in multi-practice audit of diabetes. Surveys of audits in primary care have shown wide variation in the quality and quantity of audit performed by GPs.[8,9] Concerns about audit include uncertainty about its nature or relevance, concern about failures or mistakes being disclosed through the audit process, resistance to change, limitations of resources, limitations of time, and problems of implementation due to poor organisation and communication within practices.[10] Single-topic audits organised by medical audit advisory groups can encourage large numbers of GPs to participate and successfully bring about change in behaviour with resulting improvements in standards of care.[2,23] Our survey confirms that larger and more developed practices are more likely to participate in audit.[19,24] In addition, our survey shows that participation is dependent upon having a GP interested in the clinical topic being audited and in less socioeconomically deprived areas.

Efforts are required to encourage GPs to conduct audit and to convince them of the value of multi-practice audit, including diabetes care.[2,24] Those involved in implementation of clinical effectiveness programmes will need to work with primary care groups to continue to encourage active participation and to seek ways of encouraging involvement in audit of current non-participants.

Conclusions

The recent Department of Health White Paper sets out ambitious proposals aimed at delivering clinically effective care to patients.[5] Having a guideline and undertaking audit are activities that form part of a clinical effectiveness programme, such as clinical governance. Furthermore, guidelines and audit should be used systematically and together.[25] This survey shows that many practices are involved in clinical effectiveness programmes for diabetes in primary care. However, practices from more socioeconomically deprived areas are less likely to have clinical effectiveness programmes. Recent studies[26,27] have confirmed the existence of an inverse socioeconomic mortality gradient in diabetic people. Our study shows that practices with disadvantaged patient populations, and therefore the greatest need, are less likely to have fully implemented clinical effectiveness programmes. This presents a challenge to the implementation of clinical governance within primary care groups. Resources may need to be targeted at smaller practices and practices in socioeconomically deprived areas. The success of clinical governance will depend on the development of effective implementation programmes by health authorities and primary care groups that are intended for all practices rather than only those that are already well developed.

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