Scottish Needs Assessment Programme

Diabetes mellitus

OFFICE FOR PUBLIC HEALTH IN SCOTLAND

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Acute Services Network

Diabetes mellitus

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1. Executive summary

Diabetes is a chronic disorder due to lack or diminished effectiveness of insulin. Each year in Scotland, 4,000 people will be newly diagnosed with diabetes. Of these, 240 will be children.

Approximately 108,000 Scottish residents have diabetes. This figure is set to rise to 115,000 by 2006 on the basis of projected population ageing. Further increases may follow diagnostic changes and increasing population obesity and physical inactivity. Each year, 2,700 people are recorded as dying of a diabetic related complication.

There are marked inequalities in diabetes related death rates. People in DEPCAT 7 areas have higher recorded standardised mortality ratios and lower mean ages at death than people in DEPCAT 1 areas. Further research is required to determine whether this is a causal effect such as reduced access to effective health care, increased prevalence or due to a confounding effect such as chronic disease leading to unemployment and poverty.

In people with diabetes, one quarter may have clinical significant heart disease, whilst blindness, renal failure and amputation each affect 1 in every 100. Adverse psychological and social consequences also occur more frequently than in the non-diabetic population.

The St Vincent Declaration specified target reductions in the incidences of diabetic blindness, endstage renal failure and amputation and morbidity and mortality from coronary heart disease and diabetic pregnancy. Effective diabetes care can mitigate these effects by preventing or delaying the onset of diabetes, earlier diagnosis, control of blood sugar and other risk factors and prompt identification and management of complications. Short term improvements in diabetes care will be achieved by appropriately shared care, further education for professionals, better self-management and adequate delivery of currently available interventions underpinned by comprehensive registers.

1.2. Commissioning issues

i) All providers of diabetes care in primary and secondary care should demonstrate registration of people receiving diabetes care to ensure that the key elements are provided to each patient and to facilitate the monitoring of outcomes in Scotland (see v & vi below).

ii) Shared care is the preferred organisational structure for the provision of diabetes care. The balance of responsibility will depend on the general practitioner's skills, access to hospital services and the views of the patient.

iii) Unmet need identified in diabetes registers is likely to lead to increased demand and will require greater provision of shared care.

iv) Multiagency and multidisciplinary health promotion approaches - smoking reduction, increased exercise and weight control taking account of deprivation - should be complemented by specific patient education.

v) The Scottish Intercollegiate Guideline Network (SIGN) has published a series of guidelines. Providers should implement local protocols based on these guidelines.

vi) The minimum outcome indicators should be those specified in the Saint Vincent Declaration, HbA_1c levels and hospital admissions with ketoacidosis, hyperglycaemia and hypoglycaemia.

vii) Further research is required to:

a) explore the associations between deprivation and diabetes prevalence, incidence, access to heath care and outcomes
b) understand patients' views of services and improve self-management
c) test practical ways of developing high quality shared care services

2. Epidemiology of diabetes mellitus

2.1. Introduction

Diabetes mellitus is a chronic disorder characterised by high blood sugar levels, resulting from the lack or diminished effectiveness of the hormone insulin.[i] It has the potential to reduce the physical, psychological, and social quality of life of both the patient and his or her family.

2.2. Definition

There are two main types of diabetes: insulin-dependent and non-insulin-dependent. Insulin-dependent diabetes mellitus (IDDM) has a sudden onset of thirst, passing large quantities of urine, increased appetite and weight loss necessitating prompt medical treatment. It usually commences before the age of 30 years, and accounts for 10% to 15% of people diagnosed with diabetes mellitus. Non-insulin-dependent diabetes mellitus (NIDDM) is usually detected after the age of 30 years, by routine or chance screening tests or following clinical presentation with the complications of long-standing diabetes mellitus.[ii]

2.3. Aetiology

IDDM results from inadequate insulin production, possibly due to autoimmune problems. In NIDDM, insulin production is reduced or less effective (insulin resistance).[iii] Four primary risk factors are recognised for NIDDM: increasing age, genes, obesity and lack of physical exercise.[iv]

2.4 Diagnostic criteria

The diagnosis of diabetes requires the presence of two elevated blood glucose levels measured on different days. A blood glucose sample is elevated if it was either 7.8 mmol/l or more after fasting or 11.1 mmol/l or more following a standard oral dose of sugar.[v]

The American Diabetes Association recently recommended reducing the fasting threshold to 7.0 mmol/l and not using the oral glucose test.[vi] The World Health Organisation (WHO) is consulting on these recommendations and they may subsequently be adopted in the UK.[vii] If the new criteria were applied, there would be considerable reclassification of individuals when compared with the previous WHO definition, and prevalence would rise in elderly groups.[viii]

2.5. Data sources

Key data sources used to assess the health burden of diabetes in Scotland were: death certificates reported to the General Registrar's Office, inpatient discharges from Scottish hospitals (Scottish Morbidity Record (SMR1)), and the Tayside and Lanarkshire Diabetes Registers.

2.6. Incidence

New adult cases of diabetes mellitus in the UK have been estimated to occur at a rate of 100/100,000 adults per year, equivalent to 3850 people in Scotland.[ix] The

incidence in those 0-13 years of age in Scotland was 25 per 100,000 per year equal to 240 young people.[x]

2.7. Prevalence

Although there was a variety of hospital and practice based registers, as yet there is no single comprehensive register of people with diabetes mellitus in Scotland. Lanarkshire and Tayside were the only Scottish health board areas to have comprehensive area wide diabetes registers by 1997.

Detailed analysis has been undertaken using data from 11,000 diabetes records on the area-wide Lanarkshire diabetes register.[xi] The overall prevalence of clinically diagnosed diabetes in Lanarkshire was 19.7 per 1,000 (5.4 per 1,000 regularly used insulin and 14.3 per 1,000 did not use insulin regularly). The prevalence rose gradually in males and females until 40 years. Thereafter, the male prevalence rose by 11 per 1,000 per 5-year age band. A similar increase in women occurred 10 years later, and rose by 9 per 1,000 per 5-year age band, Figure 1. The male age-specific prevalence of clinically diagnosed diabetes mellitus was 40% higher than the equivalent female prevalence. But as prevalence increases with age and women live longer, the overall male to female ratio of people with diabetes was 1.18:1.

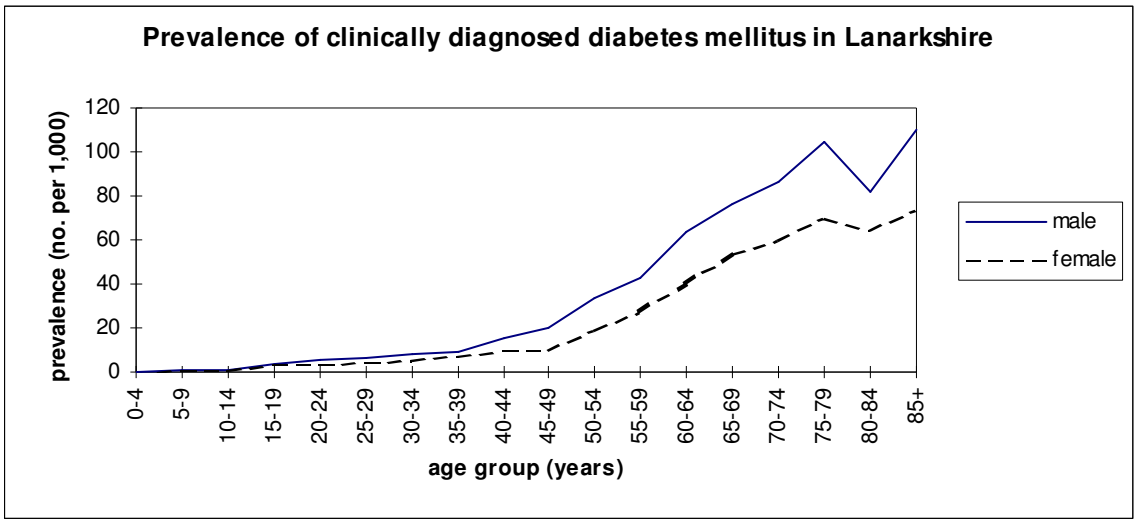


Figure 1

A similar overall prevalence of clinically diagnosed diabetes (19.4 per 1,000) was reported in Tayside (male to female ratio 1.12:1). In Tayside, distinction was made between diabetes type rather than insulin use (2.1 per 1,000 had IDDM and 17.3 per 1,000 had NIDDM).[xii]

As a comparison, the Lanarkshire age-sex specific prevalence data were applied to the Tayside population figures, and an overall prevalence of 22.7 per 1,000 (5.7 per 1,000 using insulin and 17.0 per 1,000 not using insulin) calculated. Therefore after standardising for age and sex, the recorded prevalence of diabetes in Tayside was 15% less than in Lanarkshire.

Applying the Lanarkshire data to Scotland, there would be approximately 108,000 people with diabetes, of whom 29,000 would regularly use insulin, Figure 2. (See also appendix A)

Number of people with clinically diagnosed diabetes mellitus in Scotland by age group and insulin use (extrapolated from Lanarkshire age specific prevalence data)

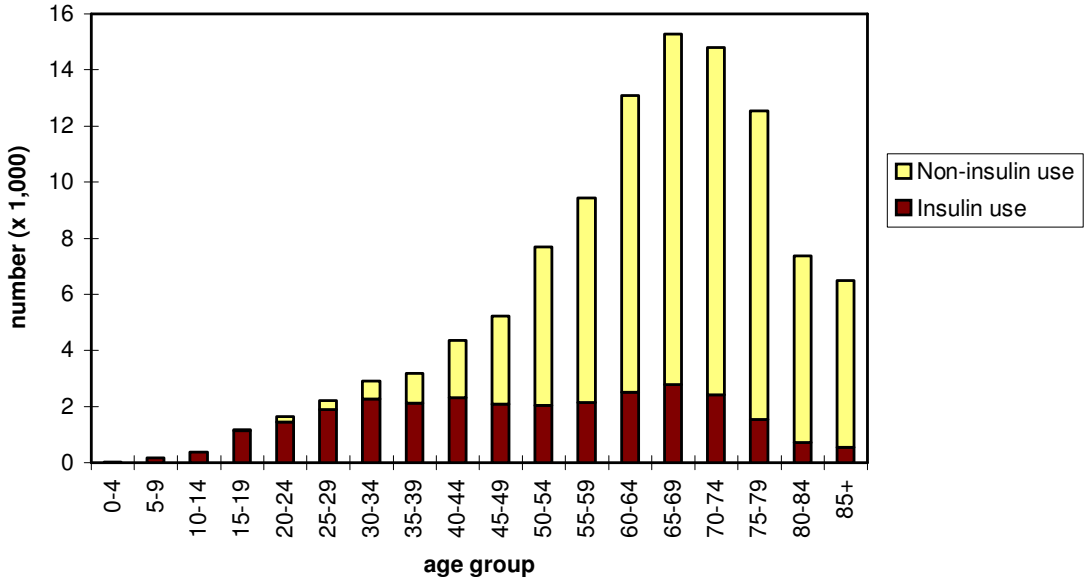


Figure 2

The ethnic minority comprises 1.25% of the Scottish population, of whom 0.94% are "Asians" (those people whose origins lie in the Indian sub-continent), and 0.31% are "Black".[xiii] These ethnic groups have an estimated prevalence of diabetes mellitus 3-8 times greater than the "White" population.[xiv] Although these groups have a small effect on the total burden due to diabetes in Scotland, the impact is disproportionately higher in parts of Aberdeen, Dundee, Edinburgh and Glasgow cities where ethnic communities comprise 3% of the population.

If age-specific prevalence rates remain constant, the number of people with diabetes in Scotland is likely to rise by 6.5% by the year 2006 due to ageing of the population.[xv] This would result in a total of 115,000 people with diabetes. Earlier diagnosis, improved survival and increasing population obesity and inactivity would further increase the total.

2.7. Complications of diabetes

High blood sugar (hyperglycaemia) can result from severe illness, infection, and inadequate treatment. It is estimated to lead to one hospital admission for every 200 persons with diabetes mellitus each year, i.e. 540 admissions in Scotland. The proportion dying as a result of hyperglycaemia even after admission is 3% to 10% (16 to 54 in Scotland) and is greater in the elderly.[8]

Low blood sugar (hypoglycaemia) often passes unrecognised, but can lead to sweating, tremor and excessive hunger, then to mild confusion, and rarely can even result in coma and death. Significant episodes of low blood sugar occur in 10% of those using insulin in any one year (3,000 people). Elderly patients and those with kidney disease are at increased risk.[xvi]

Hyperglycaemia and hypoglycaemia can occur and resolve over short periods of time (less than 1 month). However, other longer-term complications account for most of the mortality and morbidity associated with diabetes mellitus.

Diabetes is associated with premature and severe narrowing of the arteries. As a result, coronary heart disease and stroke are experienced at an earlier age, with greater frequency (three-fold increase), and with greater severity than the general population. They are the commonest causes of death in those with diabetes mellitus over the age of 50 years.[xvii,xviii] In Lanarkshire, 22% of people with diabetes had a history of ischaemic heart disease. Arterial disease can cause painful cramps in the leg muscles that can eventually progress to gangrene and amputation. Among people with diabetes other factors, such as smoking and high blood pressure interact to increase markedly the risk of vascular disease.[xix,xx]

Diabetes is the commonest cause of blindness in people between 20 and 65 years of age in the United Kingdom.[3] In Lanarkshire, 1% of people with diabetes suffer blindness. Nerve pain, foot ulceration, bowel disturbance, male impotence, and bacterial and fungal infections occur more frequently in those with diabetes mellitus.

An estimated 20% of persons diagnosed as having IDDM before the age of 30 years will die of kidney disease, and 50% of those with diabetes for 20 years may have clinically significant kidney disease.[xxi]

Infection and thickening of the skin at the insulin injection sites are the commonest skin problems associated with diabetes.

IDDM can be expected to be present in 235 pregnancies each year within Scotland, equivalent to a rate of 3.5 per 1,000 pregnancies. Increased perinatal mortality rates and major congenital malformation rates have been shown to be associated with poor blood sugar control.[xxii,xxiii] Data from specialist centres has indicated that the viable fetal loss (the sum of the still birth and infant loss) can be up to 4 times greater than the general population, with fetal malformation rates 8 times greater than expected.[22, xxiv] A national audit of pregnancy and diabetes is currently being conducted in Scotland.

Gestational diabetes is associated with adverse fetal outcomes[xxv, xxvi] and may occur in a further 2000 pregnancies in Scotland each year.

2.8. Mortality

2.8.1. Mortality trends

During 1987 to 1996, the annual average number of diabetes related deaths was 2720 (1275 male and 1445 female). Assuming the annual number of new cases of diabetes (around 4000) is in equilibrium with the number of deaths (i.e. constant

prevalence), diabetes is recorded as a cause or contributory cause of death in 70% (2720/4000) of people with diabetes who die.

The average male standardised mortality rate for deaths related to diabetes mellitus in Scotland was 51.8 deaths per 100,000 during 1987 to 1996, Figure 3. However, over this period it increased by 19%. The average female standardised mortality rate for deaths related to diabetes mellitus in Scotland was 54.9, Figure 4, and showed a marginal decrease of 2% over the ten-year period. By 1996, male and female standardised mortality rates were equal. This was unexpected, as the male age-specific prevalence of clinically diagnosed diabetes was estimated to be higher than the female prevalence by 40% based on register data.

Deaths related to diabetes mellitus
Standardised Mortality Rates per 100,000 population
for Scotland residents, 1987 to 1996

Figure 3

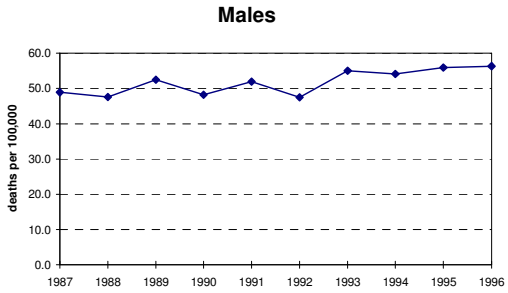
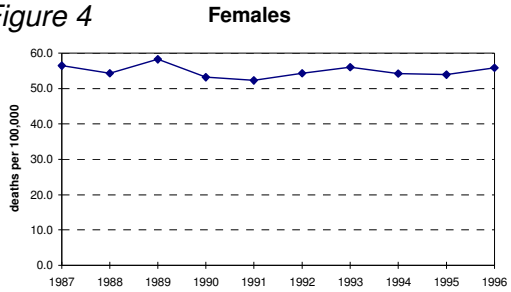


Figure 4



For deaths associated with diabetes mellitus during 1997, the mean ages at death for men and women in Scotland were 71.3 and 75.9 years respectively. Between 1987 and 1996, the mean age in men increased by 1.5 years (70.5 to 72.0) whereas that for women increased by 0.8 years (75.4 to 76.2 years), Figures 5 & 6.

Deaths related to diabetes mellitus:
mean age at death for Scotland residents by year,
1987 to 1996

Figure 5

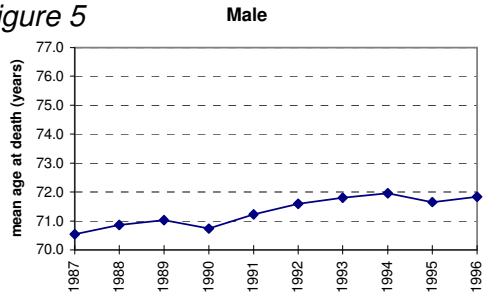
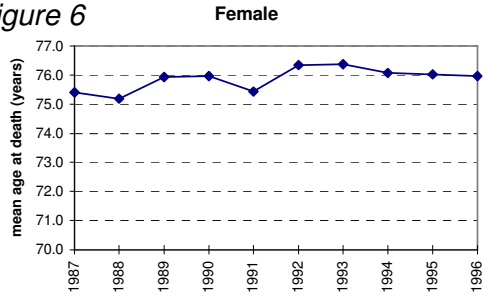


Figure 6



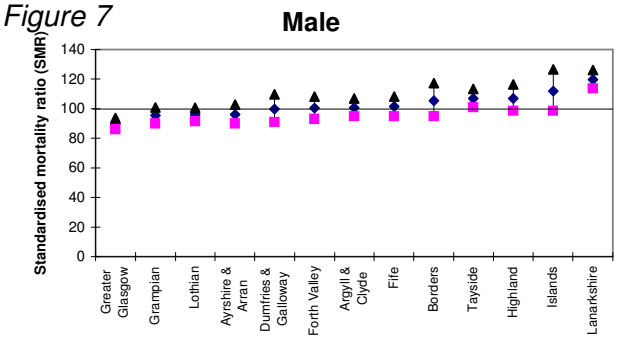
2.8.2. Mortality by health board area

Standardised mortality ratios

Standardised morality ratios with 95% confidence intervals are shown for each mainland health board area, Figures 7 & 8. Data for Orkney, Shetland and Western Isles were combined because of their small populations. Lanarkshire male and particularly female mortality ratios were higher than all other health boards (120 and 125 respectively). Male and female standardised mortality ratios for Greater Glasgow were significantly lower than the rest of Scotland (90 and 91 respectively).

Deaths related to diabetes mellitus in Scotland:
Standardised Mortality Ratios with 95% confidence intervals
by Health Board of Residence, 1987 to 1996

Figure 7



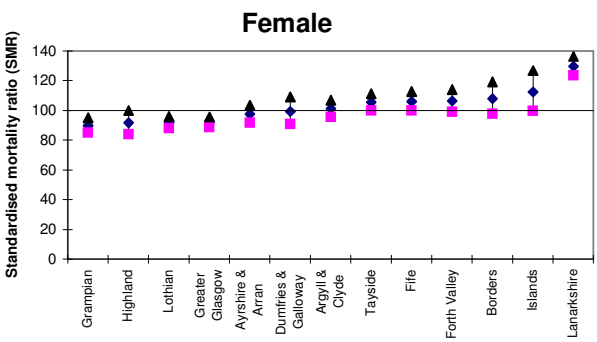


Figure 8

Although Greater Glasgow and Lanarkshire Health Boards had significantly lower and higher male standardised mortality ratios than for Scotland overall, they had the lowest mean ages at death (69.7 and 70.5 years respectively), Figure 9. This situation could arise if prevalence of clinically diagnosed diabetes was lower in Glasgow than in Lanarkshire, particularly in the older age group, or if diabetes as a contributory cause of death was under-recorded in older Greater Glasgow people compared to other Scottish residents.

Although male mortality ratios for all other health board areas were not significantly different than the Scottish average, their mean ages at death varied widely between 70.6 years and 73.9 years. These differences reflect health board area demographics: in other words, some will have an older population but taking account of age and sex differences these health board areas do not have a higher than expected number of deaths.

Deaths related to diabetes mellitus:
mean age at death for Scotland residents
by health board area, 1987 to 1996

Figure 9

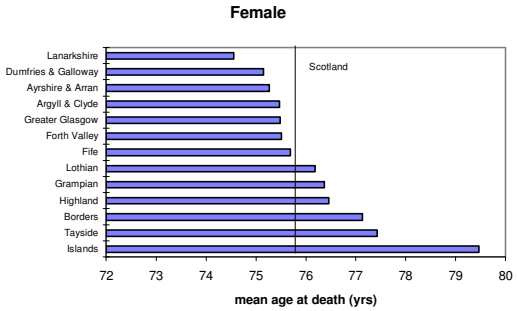


Figure 10

Lanarkshire had significantly more female deaths attributed to diabetes than expected (standardised mortality ratio 125) and had the lowest mean age of death (74.6 years). This pattern is consistent with higher prevalence (actual or due to more comprehensive recording) and poorer outcome (as people die younger). The female standardised mortality ratios for Grampian, Glasgow and Lothian were significantly lower than the rest of Scotland but had average mean ages at death, Figure 10.

2.8.3. Mortality by deprivation

There was a very strong relationship between male standardised mortality ratios and deprivation category, Figure 11. The association between male mortality and deprivation was formally tested using Spearman's rank correlation test (correlation coefficient =0.964; p<0.001). The observed male standardised mortality rate in DEPCAT 7 areas was 1.66 times that of DEPCAT 1. A similar but even more marked difference was observed for female standardised mortality ratios tested by Spearman's rank correlation test (correlation coefficient = 1.00; p<0.001). The observed female standardised mortality ratio of DEPCAT 7 areas was 2.2 times that of DEPCAT 1, Figure 12.

Deaths related to diabetes mellitus in Scotland
Standardised Mortality Ratio with 95% confidence intervals
by DEPCAT score, 1987 to 1996

Figure 11 **Male**

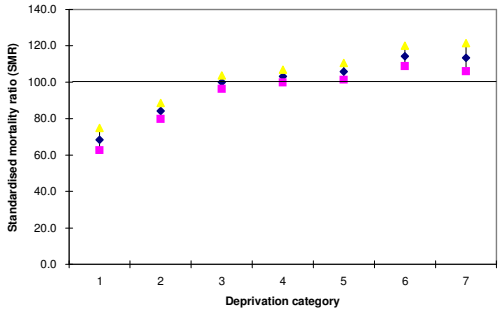
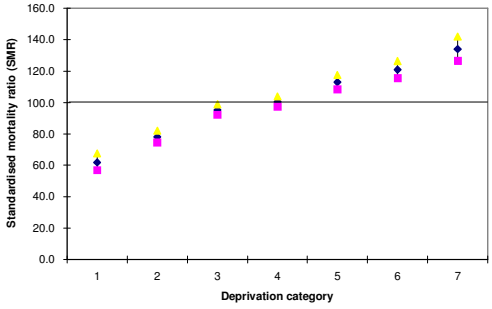


Figure 12 **Female**



The mean age at death in those who died of a diabetes related disorder fell by an average of 11 and 9 months for each increase in DEPCAT score for males and females respectively, Figures 13 & 14. The correlations between male and female mean ages of death and deprivation were again statistically significant (P<0.001).

Deaths related to diabetes mellitus in Scotland
mean age at death by DEPCAT score,
1987 to 1996

Figure 13 **Male**

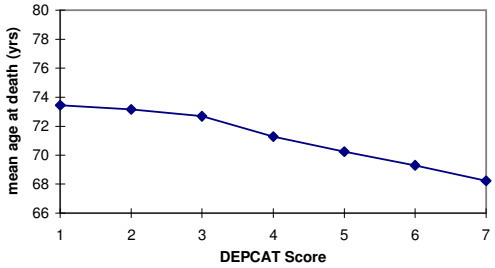
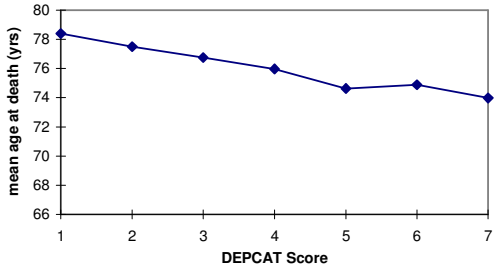


Figure 14 **Female**



Increased deprivation was associated with higher standardised mortality ratios and with lower mean age at death. This is consistent with both a higher prevalence of diabetes, greater recognition of diabetes as a cause of death and poorer outcomes in those who are socio-economically deprived. Whether this is a causal effect such

as reduced access to effective health care, or a confounding effect such as chronic disease leading to unemployment and poverty requires further study.

Further population comparisons in mortality, prevalence and quality of diabetic services by DEPCAT should be undertaken.

2.9. Key Points

* 3850 adults and 240 persons aged 0-13 years will be newly diagnosed as having diabetes mellitus each year in Scotland.

* Approximately 108,000 people have clinically diagnosed diabetes in Scotland, of whom 29,000 will regularly use insulin.

* The number of persons with diabetes will rise to 115,000 (6.5%) by the year 2006 due to ageing of the population. This may increase further by changes in diagnostic criteria and population obesity and exercise.

* The prevalence of diabetes in Asian and Black ethnic communities is 3 to 8 times that of White populations.

* The annual average number of diabetes related deaths is 2,700, 70% of people with diabetes.

* There were very strong statistical associations between increasing DEPCAT score and higher standardised mortality ratios and lower mean age at death in both men and women. DEPCAT 7 areas had a standardised mortality ratio of 1.7 times and 2.2 times that of DEPCAT 1 areas and a mean age of death 5.2 years and 4.4 years younger than in DEPCAT 1 areas for males and females respectively. Further research is required to determine the causes of these differences and target effective health care interventions.

3. Clinical practice and future developments

3.1. Introduction

In 1989, representatives of Government Health Departments and patient organisations from all European countries under the aegis of the World Health Organisation (WHO) unanimously adopted the Saint Vincent Declaration (Appendix B).[xxvii] The declaration consists of a series of goals and targets, which if met would achieve significant health gain.

The Scottish Intercollegiate Guidelines Network (SIGN) has published clinical guidelines on diabetes care to facilitate progress towards the Saint Vincent targets.[xxviii,xxix,xxx,xxxi,xxxii,xxxiii,xxxiv,xxxv]

3.2. Shared care

Shared diabetes 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".[xxxvi] The Royal College of General Practitioners considers the key elements of shared diabetes care to be:

- registration,
- recall and regular review,
- sharing of rather than shifting care,
- careful joint planning,
- piloting and local interpretation of standards,
- mutual respect,
- simple audit, and
- recognition of practical and local difficulties.[xxxvii]

Shared care as a managed clinical network has the potential to be as or more effective than traditional diabetes clinics. But best results are obtained where practices have identified general practitioners with special interests in diabetes, working in well-equipped practices with adequate support from specialist medical, nursing, podiatry, dietetic and laboratory services and with constructive audit.[xxxviii,xxxix,xl,xli] It is likely that within the next five years, improvement in diabetes care will be achieved through further education of professionals, better self-management and adequate delivery of interventions already available, rather than development of radically new treatments.

3.3. Diabetes services

Introduction
A comprehensive diabetes service provides the following elements of care: diagnosis, initial treatment, education, dietary advice, drug treatment, blood sugar control, and screening for and treatment of complications.

Diagnosis
Screening and early diagnosis of diabetes mellitus is discussed in the next chapter.

Initial treatment
Those with IDDM usually become unwell over several weeks. If the condition is identified early, initial treatment and stabilisation of blood sugar level can be managed as an outpatient or by the primary care team. Otherwise, hospital admission is required to monitor blood sugar levels and replace body fluids. Several days to two or more weeks inpatient treatment may be needed.

Education
The daily management of diabetes is the responsibility of the patient, so a high degree of knowledge and understanding of diabetes is required by the individual patient, his/her family, and others, such as school teachers.[xlii, xliii, xliv, xlv,] Diabetic liaison sisters frequently initiate education at diagnosis, but all professionals must ensure that it continues. The Health Education Board for Scotland has a patient education information database and the British Diabetic Association issues guidelines and information packs to its members.

Dietary advice
The goal of dietary advice is to promote and maintain a healthy and balanced nutritional intake by personalised advice and guidance. [xlvi,xlvii]

Drug treatment
Insulin treatment is essential in IDDM and is sometimes required in NIDDM for reducing blood sugar. Several equally effective forms of insulin exist, although patients may have a preference. Control of blood sugar can be achieved by two subcutaneous injections of insulin each day. Alternatively a quick acting insulin injection can be used before each meal, requiring a higher level of knowledge and understanding, but permitting a more flexible lifestyle for the patient. Close relatives should have good skills in the recognition and management of hypoglycaemia.[xlviii,xlix]

Sulphonylureas and biguanides are medications taken orally in those with NIDDM to reduce blood sugar levels when satisfactory control has not been achieved by exercise, diet or weight loss.

Blood sugar
There is good evidence that blood sugar control can reduce the morbidity and mortality associated with diabetes mellitus. The Diabetes Control and Complications Trial demonstrated that for people with IDDM, intensive insulin therapy (three or more insulin injections daily or use of an insulin pump) significantly reduced eye (50%), kidney (40%), and nerve (60%) complications compared to standard insulin regimens (one or two insulin injections daily). Side-effects of the tighter blood sugar control included increased body weight and a three fold increase in the number of

hypoglycaemic attacks in the treated group. Additional health care costs were high and mortality did not differ significantly between the two groups.[l]

The United Kingdom Prospective Diabetes Study (UKPDS) recently reported that intensive blood sugar control (mean HbA1c 7.0%) in people with NIDDM decreased eye, kidney and nerve complications by 25% compared to conventional regimens (mean HbA1c 7.9%).[li]

Complications

Feet
All those with diabetes must have access to the chiropody service for, education, regular inspection and treatment. Chiropody services can reduce the incidence of foot ulceration by 50%.[lii] Development of neuropathy can accelerate foot ulceration. Better blood sugar control prevents or delays onset of neuropathy.

Eye
Comprehensive eye care in diabetes requires education, maintenance of low blood sugar levels and regular eye screening. A full eye examination should take place when a diagnosis of diabetes is made, and at least annually thereafter. An appropriately trained individual with regular experience of eye examinations, who may be a general practitioner, hospital doctor or an optometrist, must perform the retinal examination.[liii, liv, lv] Photographic images of the retina can also be used to detect abnormalities and mobile cameras are considered particularly appropriate for rural and isolated communities.[lvi] When abnormalities are detected early, laser treatment and other surgical techniques can reduce the risk of blindness by up to 90%.[lvii, lviii]

Kidney
Urine tests for the presence of protein and blood should be performed every six months, and an annual blood test taken to determine presence or extent of kidney problems. Optimal blood sugar control[lix,lx] and hypertensive therapy[lxi,lxii] prevent development and progression of diabetic renal disease.

Cardiovascular system
Improved blood sugar levels in young people with IDDM did not significantly reduce the risk of CHD.[lxiii] However, the UKPDS reported that intensive blood pressure control with captopril or atenolol reduced the incidence of diabetic complications by 24% for diabetes related end points, 32% for diabetes related deaths, 44% in strokes and 37% for microvascular end points.[lxiv]

Mortality following myocardial infarction has been shown to be reduced by 30% at one year in those who received intensive insulin treatment at the time the infarction was taking place and following it, compared to controls.[lxv]

Pregnancy
Pregnancy outcomes in those with diabetes are improved by tight blood glucose control before conception and during the whole of fetal development.[lxvi,lxvii] The preferred service arrangements are for a special team including a named physician and named obstetrician to see all pregnant diabetic women in a combined clinic in a hospital with a neonatal unit.[lxviii]

Psychological
Diabetes is a life-long disease with serious physical complications and adverse social consequences. Members of all disciplines should maintain a high index of suspicion for psychological pathology in those with diabetes mellitus.[lxix]

3.4. Costs of health care

The NHS costs of treating diabetes mellitus and its associated complications are high. An estimated 4%-5% of the health care budget is spent on those with diabetes (2% of the population).[lxx,lxxi] Management and control of diabetes mellitus account for 55% of this expenditure and treatment of its complications 45%.[lxxii]

3.5. Key points

* The management of diabetes requires multidisciplinary interventions. Shared cared is the preferred organisational structure for diabetes services subject to adequate interest, training and support.

* High quality diabetes health care can reduce the morbidity and mortality associated with diabetes.

* Further professional education, shared care, adoption of good practice guidelines and monitoring of targets are the mechanisms through which health gain for those with diabetes will be achieved.

* Financial costs of treating those with diabetes are on average three times greater than those without diabetes, and account for 4-5% of the total health care budget.

4. Health promotion and preventive services

4.1. Prevention of diabetes mellitus and its complications

It is not possible to prevent individuals from developing IDDM. As the time from the onset of the disease to clinical diagnosis is short, screening for the presence of undiagnosed IDDM is of no value.

The situation for NIDDM is different. Weight reduction reduces the body's demand for insulin and exercise increases the effectiveness of the residual insulin.[lxxiii] Both interventions have the potential to prevent or delay the onset of diabetes mellitus.[lxxiv]

General population screening for NIDDM by blood or urine tests is not of value due to the low prevalence. However, individuals with one or more of the following characteristics - a family history of NIDDM, a history of gestational diabetes, age greater than 40 years old, a history of hypertension, a history of obesity, physical inactivity, and upper body obesity - are at higher risk of developing NIDDM.[lxxv] Regular selective screening of higher risk individuals should be carried out.

Evidence exists that 40% of NIDDM patients may have had symptoms of diabetes mellitus for more than 12 months before starting treatment. Lack of public awareness of the importance of these symptoms can contribute to this delay.[lxxvi] Public health education should play an important role in the secondary prevention of NIDDM.

Prevention and minimisation of disability and death from the complications of diabetes mellitus (i.e. tertiary prevention) were discussed in chapter 2. Good blood sugar control and the early identification of complications play a role. However, the cessation of cigarette smoking in those with diabetes mellitus (which is a major risk factor for the development of common and severe complications of both NIDDM and IDDM, including coronary heart disease, stroke and limb amputations)[lxxvii], using multidisciplinary and multiagency approaches, is essential.

Primary population prevention measures should seek to increase physical activity, improve weight control and reduce fat and cigarette consumption. These factors are tackled as part of initial and ongoing education for people with diabetes. However, the occurrence of these in the diabetic population is often similar to the non-diabetic population. Therefore, population approaches to primary prevention of diabetes and its complications are needed to improve outcomes in people with diabetes in addition to individual education measures.

General practitioners, practice nurses and other members of the diabetic team by their participation in health promotion activities and in the diabetes mellitus chronic disease management programme have collected physical, behavioural and family history details from their practice populations.[lxxviii] They are well placed to use this information to undertake primary, secondary and tertiary prevention of diabetes mellitus.

4.2. Key points

* Prevention or earlier detection of IDDM is not possible, but optimum blood sugar control can reduce morbidity, and modification of cardiovascular risk factors, such as cigarette smoking and sedentary lifestyle can reduce morbidity and mortality.

* Prevention or delay of the onset of NIDDM by weight reduction and increased exercise, its earlier detection through public health education and screening of those at high risk are of potential benefit.

* General practitioners with knowledge of their patients' lifestyles, associated diseases and other risk factors should be supported to further develop primary, secondary and tertiary prevention in diabetes mellitus.

5. Current provision and utilisation

5.1. Primary care

All general practitioners and other primary care staff provide general medical care to those with diabetes mellitus. Much of this care is not accurately quantified and its distinction from routine diabetes care can be blurred. Most general practitioners are registered with the chronic disease management programme, which requires access to structured care for those with diabetes.[lxxix]

5.2. Hospital care

5.2.1. Data

Coded diagnoses are collected for all inpatient care episodes resulting in discharges from Scottish hospitals (SMR). Discharges where diabetes mellitus was mentioned in any diagnostic position were defined as "with a diagnosis of diabetes", and those which recorded ketoacidosis or hypoglycaemia were defined as "recognised poor diabetes control".

Although SMR 1 data are useful in understanding patterns of care and have improved in recent years, their accuracy varied with time and between hospitals. Caution should therefore be exercised in interpreting these.

5.2.2. Discharges over time

Number

The total number of discharges with a diagnosis of diabetes increased from just under 15,000 in 1987 to 32,000 in 1996 and were split 50:50 between males and females.

Discharges with recognised poor diabetes control accounted for 10% of diabetes related hospital admissions. For admissions with recognised poor diabetes control the total numbers increased from 1,600 in 1987 to 2,350 in 1996 and were split 48:52 between males and females respectively.

Standardised rates

The standardised discharge rates with a diagnosis of diabetes and recognised poor diabetes control reflected the numerical increases described above.

For those with a diagnosis of diabetes there were two main phases; from a level of 300 per 100,000 there was a gradual increase to 1990, followed by a more rapid increase thereafter to around 600 per 100,000 in 1996, Figures 15 & 16.

Annual standardised discharge rates from Scottish hospitals
with a diagnosis of diabetes, 1987 to 1996

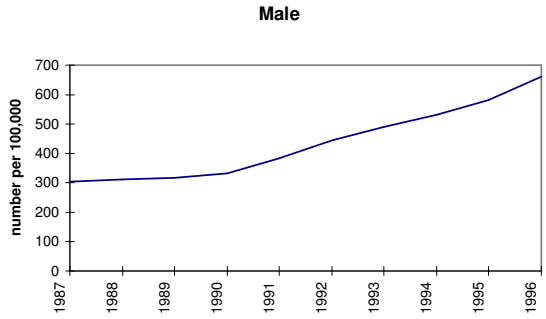


Figure 15

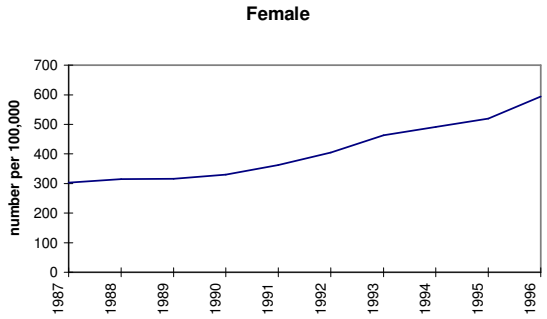


Figure 16

Standardised discharge rates with a diagnosis of poor diabetes control increased from 30 per 100,000 to a maximum 51 per 100,000 in 1995 before falling to 44 and 48 per 100,000 in males and females respectively during 1996, Figures 17 & 18.

Annual standardised discharge rates from Scottish hospitals
with recognised poor diabetes control, 1987 to 1996

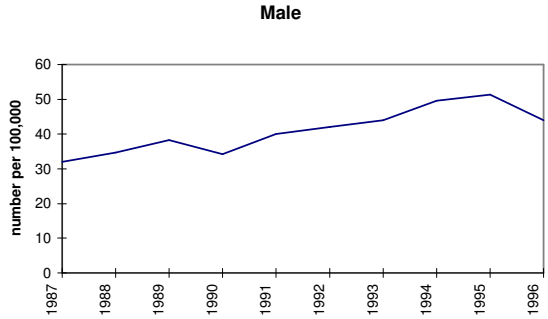


Figure 17

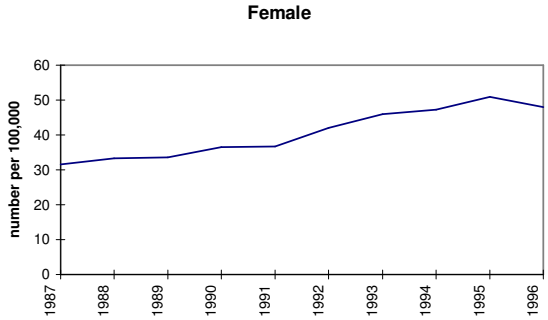


Figure 18

Length of stay & mean age of discharge

For people over the age of 14 years the mean age for male and female discharges with a diagnosis of diabetes increased from 55.5 years to 60.8 years in men and 61.0 years to 63.3 years in women during 1987 to 1996. In the same period the mean length of stay fell from 18 to 10.5 days for men and 28.1 to 14.0 days for women, Figures 19 & 20.

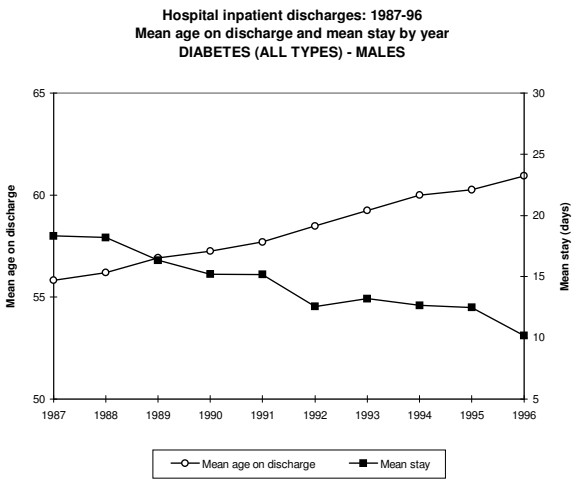


Figure 19

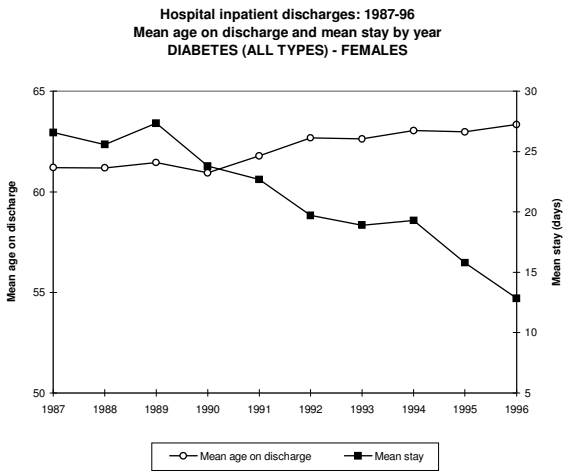


Figure 20

For people over the age of 14 years the mean age for those with poor diabetes control remained fairly constant from 1987 to 1996 at 42 years for men and 45.9 years for women. Mean length of stay was 5.5 days for men and 7.0 days for women, Figures 21 &22.

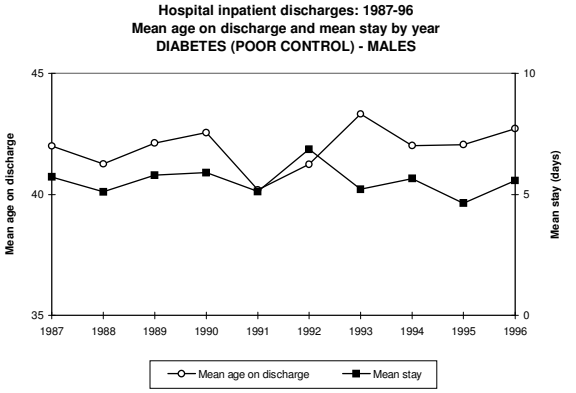


Figure 21

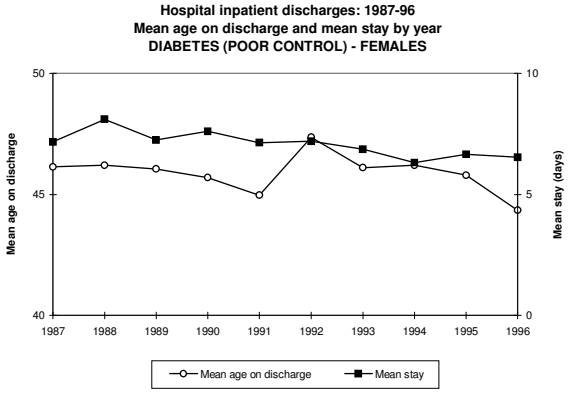


Figure 22

5.3.3. Standardised admission ratios by mainland health boards and islands

There was a wide spectrum of standardised discharge ratios by health board area ranging from 80 to 130, Figures 23 & 24.

Standardised discharge ratios (with 95% confidence intervals)
from Scottish hospitals with a diagnosis of diabetes
by health board area, 1987 to 1996

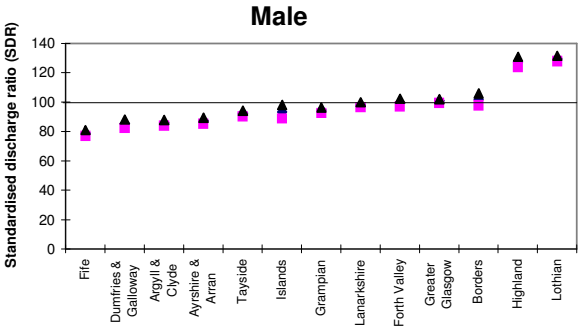


Figure 23

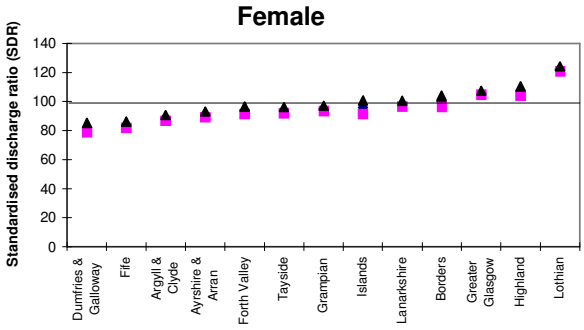


Figure 24

There was a similar spectrum of standardised discharge ratios for recognised poor diabetes control, although Highland had a particularly high male ratio of 140, Figures 25 & 26.

Standardised discharge ratios (with 95% confidence intervals)
from Scottish hospitals with recognised poor diabetes control
by health board area, 1987 to 1996

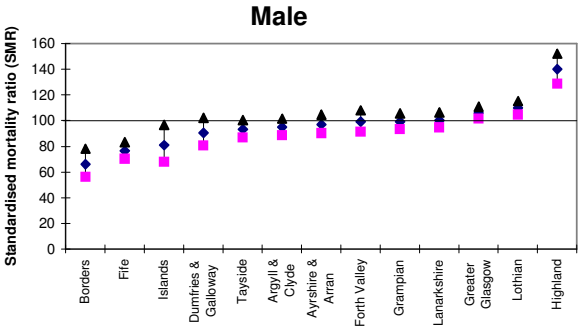


Figure 25

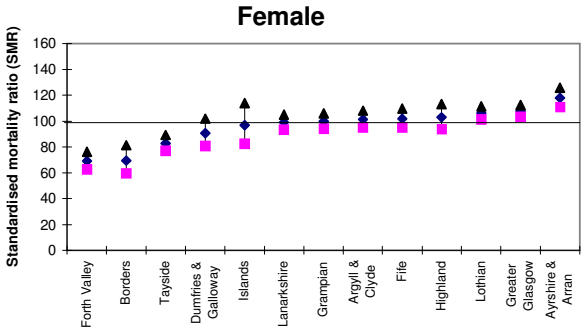


Figure 26

5.3.4. Discharges by deprivation category

There were highly statistically significant correlations between increasing DEPCAT score and standardised discharge ratio for male and female discharges with a diagnosis of diabetes and with recognised poor diabetes control. The standardised discharge ratios in DEPCAT 7 areas were more than twice as high as DEPCAT 1 areas. More research on the prevalence of diabetes by DEPCAT score is required to interpret these data, Figures 27 to 30.

Standardised discharge ratios (with 95% confidence intervals)
from Scottish hospitals with a diagnosis of diabetes
by deprivation category, 1987 to 1996

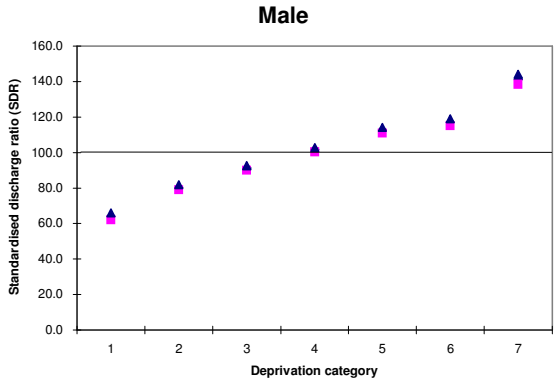


Figure 27

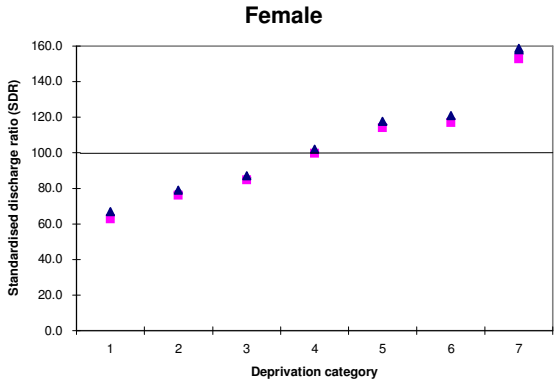


Figure 28

Standardised discharge ratios (with 95% confidence intervals)
from Scottish hospitals with recognised poor diabetes control
by deprivation category, 1987 to 1996

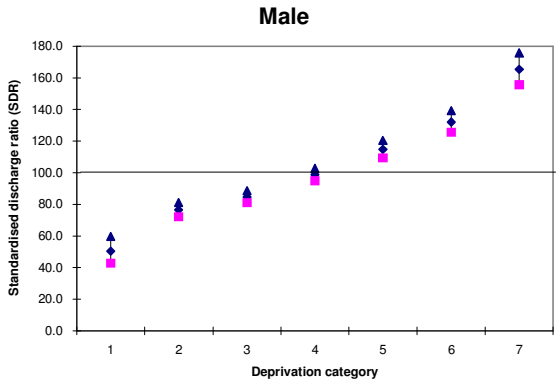


Figure 29

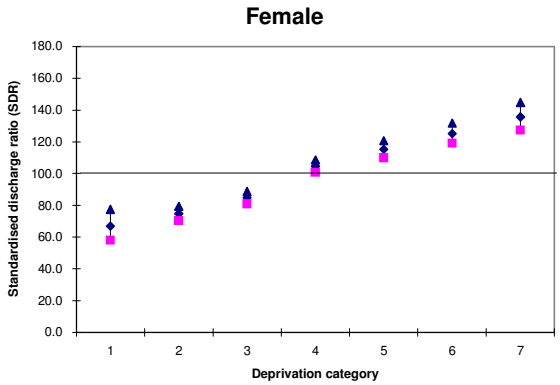


Figure 30

For people over the age of 14 years the mean age of male and female hospital inpatient discharges with a diagnosis of diabetes or recognised poor diabetes control was lower with increasing DEPCAT score. Mean length of stay did not correlate with DEPCAT score, Figures 31 to 34.

Mean age at discharge and mean length of stay
from Scottish hospitals with a diagnosis of diabetes
by DEPCAT score, 1987 to 1996

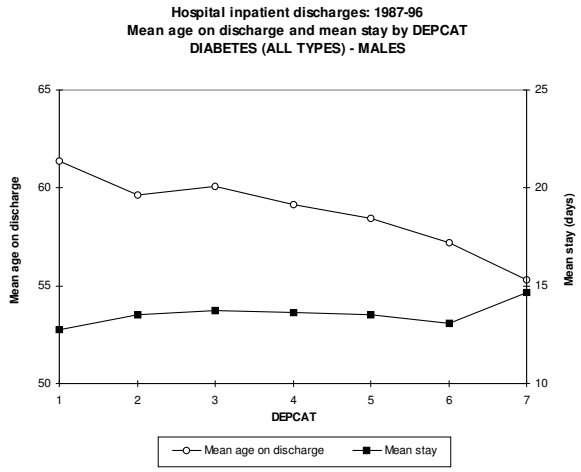


Figure 31

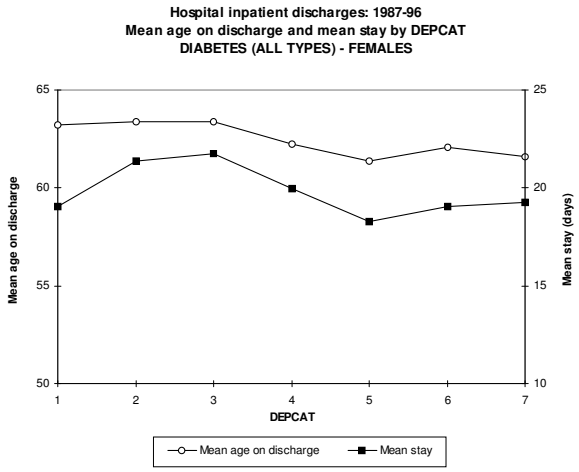


Figure 32

Mean age at discharge and mean length of stay
from Scottish hospitals with a diagnosis of poor diabetes control
by DEPCAT score, 1987 to 1996

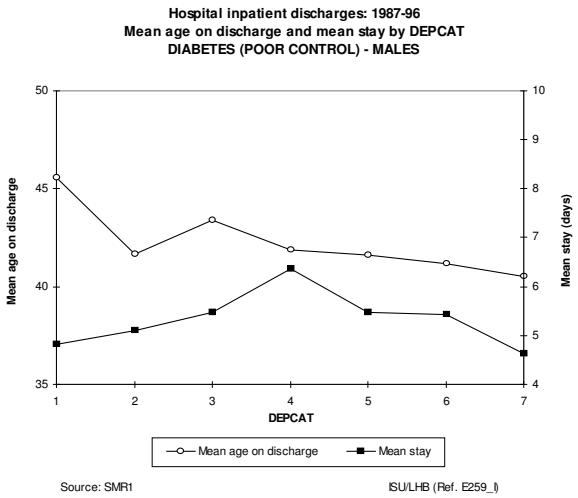


Figure 33

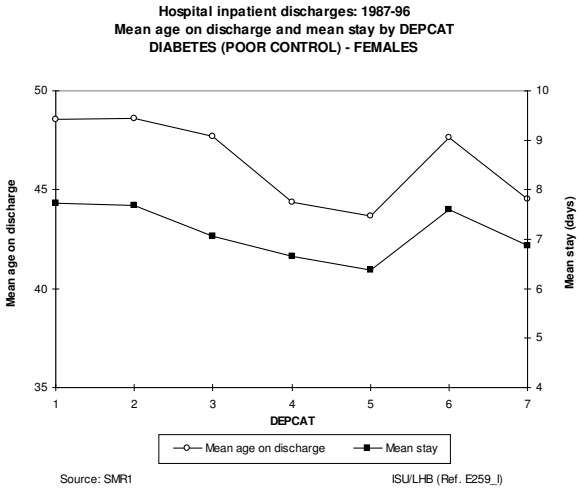


Figure 34

5.4. Key points

* Levels of provision and quality of health care for those with diabetes are currently difficult to quantify accurately.

* General medical and diabetes specific primary care services need to be provided to approximately 108,000 people with diabetes.

* The chronic disease management programme requires general practitioners to provide diabetes specific care in a structured and organised way.

* The number of people receiving hospital outpatient care in Scotland is unknown.

* Individuals may fall between primary and secondary care services by not attending either service, by poor communication resulting in elements of care being missed, or by long intervals between review and screening visits.

* Fundamental to proper clinical management is the creation of area wide comprehensive databases drawing on hospital and primary care clinical data to measure any gaps which may exist and facilitated targeted recall.

* Standardised hospital admission rates for a diabetes related condition doubled from 1987 to 1996 while mean length of stay halved. Male mean age on discharge increased by 5 years to 60.8 years and female mean age on discharge increased by 2.3 years to 63.3 years.

* Standardised discharge ratios for people with recognised poor control increased by around 50%, whereas mean age on discharge and mean length of stay was constant.

* Standardised discharge rates were closely correlated with DEPCAT score and were more than twice as high in DEPCAT 7 areas compared to DEPCAT 1 areas.

* Some of the observed variation in discharge rates, mean age on discharge and mean length of stay between health board areas could be accounted for by DEPCAT factors. Further such comparisons between health board areas should also standardise for the effects of DEPCAT as well as age and sex.

6. Commissioning diabetes services

6.1. Introduction

The Saint Vincent Declaration specified that by the year 2000 the following targets should be met:

* reduce by one third the numbers of new cases of blindness due to diabetes,
* reduce by at least one third the numbers of people entering endstage diabetic renal failure,
* reduce by one half the rate of limb amputations for diabetic gangrene,
* reduce the morbidity and mortality from coronary heart disease in those with diabetes by vigorous programmes of risk factor reduction, and
* achieve pregnancy outcomes in diabetic women that approximate to those of the non-diabetic woman.

Diabetes is a life-long disease and those affected require the provision of health care services over many years from a variety of professional disciplines. Effective diabetes care requires:

* a centralised registration system,
* organised and regular delivery of services,
* clearly identified individual roles and responsibilities, and
* monitoring of outcomes.

6.2. Commissioning issues

i) All providers of diabetes care in primary and secondary care should demonstrate registration of people receiving diabetes care to ensure that the key elements are provided to each patient and to facilitate the monitoring of outcomes in Scotland (see v) & vi) below).

ii) Shared care is the preferred organisational structure for the provision of diabetes care. The balance of responsibility will depend on the general practitioner's skills, access to hospital services and the views of the patient.

iii) Unmet need identified in diabetes registers is likely to lead to increased demand and will require greater provision of shared care.

iv) Multiagency and multidisciplinary health promotion approaches - smoking reduction, increased exercise and weight control taking account of deprivation - should be complemented by specific patient education.

v) The Scottish Intercollegiate Guideline Network (SIGN) has published a series of guidelines. Providers should implement local protocols based on these guidelines.

vi) The minimum outcome indicators should be those specified in the Saint Vincent Declaration, HbA_1c levels and hospital admissions with ketoacidosis, hyperglycaemia and hypoglycaemia.

vii) Further research is required to:

a) understand patients' views of services and improve self-management.
b) explore the associations between deprivation and diabetes prevalence, incidence, access to heath care and outcomes.
c) test practical ways of developing high quality shared care services

Appendix A

Appendix B

Saint Vincent Declaration

In 1989, the Saint Vincent Declaration was unanimously agreed by representatives of Government Health Departments and patient organisations from all European countries under the aegis of the World Health Organisation. It consists of a series of goals and targets that should be implemented in all European countries, and is summarised below.

General goals for people with diabetes;

1. sustained improvement in health experience and a life approaching normal expectation in quality and quantity, and
2. the prevention and cure of diabetes by intensifying research effort.

Five year targets

1. improve programmes for detection and control of diabetes,
2. raise awareness in the public and in health professionals of the present opportunities and the future needs for prevention of the complications of diabetes and diabetes itself,
3. improve training in diabetes management for all involved in care for people with diabetes,
4. ensure children with diabetes have care provided by specialised teams, and that families receive adequate social, economic and emotional support,
5. reinforce existing centres of excellence in diabetes care, education and research,
6. promote independence, equity, and self-sufficiency for all people with diabetes,
7. remove hindrances to the fullest possible integration of the diabetic citizen into society,
8. implement effective measures for the prevention of costly complications as follows:
    * reduce new blindness due to diabetes by one third or more
    * reduce number of people entering endstage diabetic renal failure by at least one third
    * reduce by one half the rate of limb amputations for diabetic gangrene
    * cut morbidity and mortality from coronary heart disease in the diabetic by vigorous programmes of risk factor reduction
    * achieve outcome in the diabetic woman that approximates to that of the non-diabetic woman
9. establish monitoring and control systems for quality assurance of diabetes health care provision and for laboratory and technical procedures in diabetes diagnosis, treatment and self-management,
10. promote European and international collaboration in programmes of diabetes research and development using WHO agencies and active partnership with diabetes patients' organisations,
11. take urgent action in the spirit of the WHO programme Heath for All to initiate, accelerate, and facilitate the implementation of these recommendations.

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