Prevalence and diagnosis of diabetes in one PCT care home population

Anne Prestt

Introduction

Diabetes in older people is associated with significant impairment of cognitive function (Strachan et al, 1997) and an excess of morbidity and mortality (Dornan et al, 1992; Sinclair et al, 1997). This dysfunction leads to poor ability to self-care, resulting in increased dependency and dementia (Liebson et al, 1997; Sinclair et al, 2000). The National Service Framework for diabetes (Department of Health, 2001) standards apply to all people with diabetes, including care home residents who may not be in a position to lobby for themselves and who too often do not have a champion. The number of people aged over 65 is predicted to increase by nearly 57% by 2030 (Royal Commission on Long Term Care, 1999). This study examined the prevalence and diagnosis of diabetes in the care home residents of one primary care trust.

ARTICLE POINTS

1 Diabetes in older people is associated with cognitive dysfunction and excess morbidity and mortality.

2 Previous studies lead us to expect a level of underdiagnosis in care homes.

3 Diagnosing diabetes in older care home residents can prove to be difficult.

4 A study examining the prevalence of diabetes in one PCT care home population showed a known prevalence of 12.7%.

5 Testing 100 residents for fasting plasma glucose (FPG) and HbA_{1c} uncovered three residents with FPG ≥ 7.0 mmol/l, yet 21% had an HbA_{1c} above the reference range.

KEY WORDS

- **Older people**
- **Fasting plasma glucose**
- **Diagnosis**
- **Prevalence**
- **Care homes**

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The prevalence of diabetes in older people is higher than in the general population, but known prevalence rates in care homes vary. Previous studies report rates of 8.8% (Taylor and Hendra, 2000), 9.9% (Benbow et al, 1997), 17.5% (Rockwood et al, 1998) and 26.7% (Sinclair et al, 2001). Higher rates have been found in studies that screened for diabetes using either a fasting plasma glucose (FPG) or oral glucose tolerance test (OGTT), indicating that diabetes may be underdiagnosed in care homes (Rockwood et al, 1998; Sinclair et al, 2001). The population of residents in care homes is a vulnerable group whose quality of life will be affected by lack of diagnosis.

This two-stage study explored the prevalence and diagnosis of diabetes in residents aged over 65 years in care homes in one primary care trust (PCT). In stage 1, a postal questionnaire was used to survey all nursing and residential homes in East Lincolnshire PCT to determine the known diabetes prevalence and treatments used. In stage 2, 100 residents not known to have diabetes had blood samples taken for FPG and HbA_{1c} tests, and a face-to-face questionnaire was used to identify the presence of symptoms.

In 2001 the prevalence of diabetes mellitus in Lincolnshire nursing homes was estimated to be 9.7% using a postal questionnaire (Walton, 2002, unpublished). In comparison, the known prevalence of diabetes in the general population in East Lincolnshire PCT, based on chronic disease management figures (Lincolnshire Health Authority, 2001), was 3.2%. If previous studies are representative of care home residents in the UK, there are a large number of people who have diabetes but do not know it and are therefore not receiving the care needed to improve their quality of life or extend their life.

Symptoms of the disease, whether recognised or not, worsen quality of life. Such symptoms include memory loss, incontinence and increased rates of infection, such as urinary tract infection. There is a duty of care to find the undiagnosed. Screening for diabetes could be done at time of entry to the home as part of the individual's general health assessment.

Diagnosing diabetes in an older, perhaps asymptomatic population is fraught with problems. These include the time constraints of the OGTT, ensuring an overnight fast for either OGTT or FPG, and the need for a venous blood sample. The OGTT is poorly reproducible (Eschwege et al, 2001) as isolated hyperglycaemia can be transient. In the National Health and Nutrition Examination Survey (NHANES) III study,

FPG underestimated glucose abnormality more frequently with increasing age (Resnick et al, 2000). Older people have a low calorie intake, partly because of an age-dependent loss of appetite (Morley, 1997); consequently, impaired carbohydrate metabolism shown by an elevated 2-hour level in an OGTT may not reflect day-to-day responses to normal dietary intake in this population.

Perhaps older people need different criteria for diagnosing diabetes. The difficulties of diagnosing diabetes in older people have long been discussed (Andres, 1971). The cut-off level for diagnosing diabetes is necessarily arbitrary, and a quick and simple test requiring no specific preparation would increase the likelihood that screening would be carried out. Using a test of chronic hyperglycaemia such as HbA_{1c}, which can be taken from a finger-prick at any time of day, might overcome these problems. Convenience of testing should not be underestimated.

Changes in the diagnostic criteria over time have generated discussion on the pragmatic aspects of diagnosing the growing number of people with type 2 diabetes, and there is considerable interest in extending the use of HbA_{1c} to include diagnosis in addition to the monitoring of diabetes (Peters et al, 1996). However, there are problems to overcome, such as lack of standardisation.

The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus (American Diabetes Association [ADA], 2003) believes it is premature to add HbA_{1c} to the group of tests used for the definitive diagnosis of diabetes, but it acknowledges that there are numerous advantages to its use in diagnosis and may reconsider it in the future.

Aims of the study
The aims of this study were to determine:
- the known prevalence of diabetes mellitus in residential and nursing homes in East Lincolnshire PCT
- the percentage of people not known to have diabetes who are subsequently diagnosed using FPG levels of ≥7.0 mmol/l
- how many of those newly diagnosed were asymptomatic
- the specificity and sensitivity of diagnosis of diabetes in this older population using HbA_{1c}, compared with FPG.

Method
This two-stage study of mixed design was carried out between November 2003 and April 2004.

In stage 1, a postal questionnaire was sent to all nursing and residential care homes in East Lincolnshire PCT. The managers of the homes were asked to provide information on the total number of residents in their home, how many of them were known to have diabetes, and the diabetes treatments those residents were taking. The questionnaire also asked the managers if they were willing for their residents to be approached to take part in stage 2 of the study.

Stage 2 involved sampling for FPG and HbA_{1c} after a fast of more than 8 hours in those not known to have diabetes who gave informed consent. In addition, at the time of the sample collection a short face-to-face questionnaire was used to determine whether residents had any recognisable symptoms of diabetes. The participants were asked if, in the last few weeks, they were more thirsty than usual, needed to go to the toilet to pass urine more often at night or had blurred vision.

Residents had to be 65 years or over. Exclusion criteria were: residents on recent steroids; residents with an acute intercurrent illness; and residents with haemolytic anaemia or polycythaemia. The residents were all Caucasian; those with undiagnosed haemoglobinopathies were excluded if reported so by the pathologist.

Data analysis
The prevalence of diabetes uncovered by this study was compared with the estimated prevalence of 3 years previously, and the distribution of treatment options was compared with that of 3 years ago using the chi-squared test for significance of difference. The existence of a statistical association between FPG and HbA_{1c} was examined using a scatter plot with a regression line added. Pearson's correlation was used to measure the strength of the linear association.

The original plan was to use receiver operator characteristic curve (ROC) analysis to determine the sensitivity and specificity of HbA_{1c} for determining diabetes at increasing HbA_{1c} cut-off levels. This analysis would

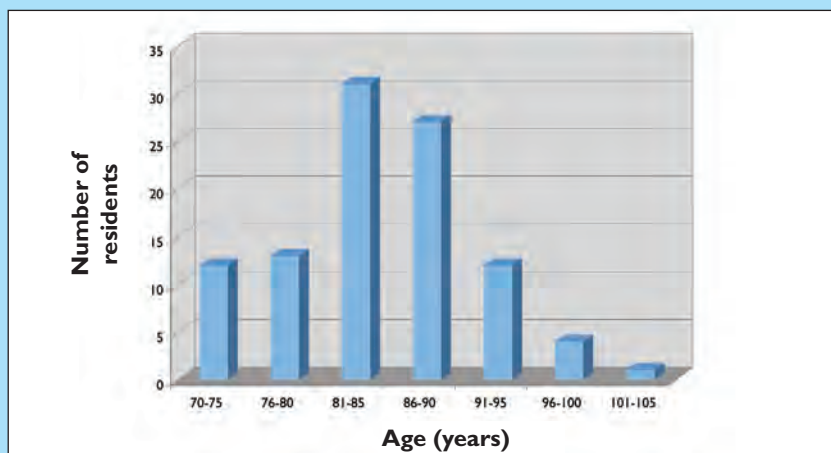| Table 1. Comparison of diabetes treatment data from care homes for 2001 and 2004.		
	2001	**2004**
Diet treatment	27%	24%
Oral medication	50%	52%
Insulin, with or without tablets	23%	24%

Figure 1. Bar chart showing age distribution of the care home residents.
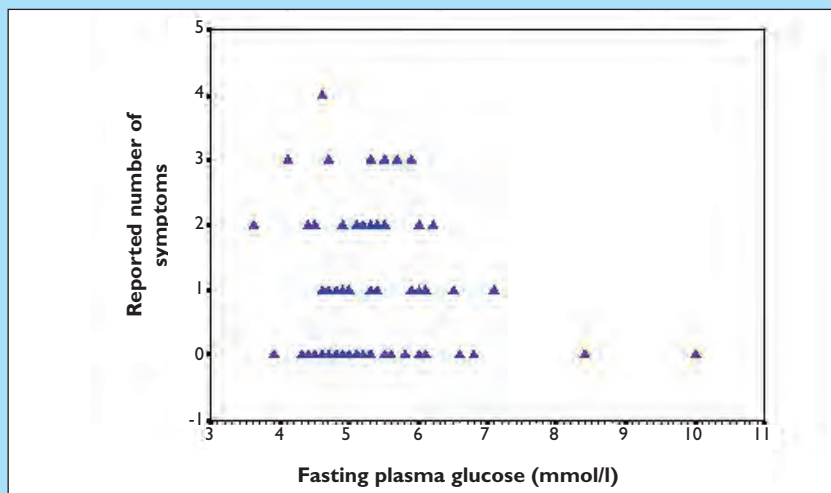

Figure 2. Scatter graph showing the relationship between fasting plasma glucose and symptoms.

evaluate the possibility of a diagnostic test for classification as either 'having diabetes' or 'not having diabetes'. However, the data did not generate enough results that were positive for diabetes to enable ROC to be used.

The reporting of symptoms was compared with participants' FPG and HbA$_{1c}$ levels separately using a scatter graph to indicate any relationship between the variables.

Results

The stage 1 postal questionnaire was sent to the home managers of 126 care homes. Sixty-five were returned (52% response rate) and were entered into the study. The combined total number of residents was 1920. Of these, 243 were known to have diabetes. This gave a current prevalence rate of 12.7% – an increase of 3.0% since 2001. Compared with the use of oral medications and insulin (with or without tablets), the use of diet treatments showed the largest proportional change between 2001 and 2004; however, this change was not statistically significant ($P = 0.324$; *Table 1*).

In stage two, 24.5% of homes agreed to take part; however, four homes withdrew before data collection. The number of residents not known to have diabetes in the 12 participating homes was 355, of whom 110 (31%) consented to having blood samples taken. Ten residents were excluded due to breaking exclusion criteria (e.g. fast broken prior to blood sampling, age found to be under 65 years after consenting, the presence of an intercurrent illness). Of the remaining 100 residents, 81 were female and 19 were male, reflecting the demographic trend in gender ratio in this age group. The mean age of residents consenting was 84 years (*Figure 1*).

Presence of symptoms

There was no relationship between FPG level and the reporting of osmotic symptoms (*Figure 2*). Inexplicably, residents with FPG levels in the normal range were more likely to report symptoms than those with elevated FPG levels. This was also true for HbA$_{1c}$ (*Figure 3*).

Blood sampling

Of the 100 participants, only three had FPG levels in the diabetic range of ≥7.0 mmol/l. Six had results in the range for impaired fasting glycaemia (6.1–6.9 mmol/l) and 91 had normal FPG levels. However, when the revised criteria for impaired fasting glycaemia (ADA, 2003) were applied (5.6–7.0 mmol/l), a further 11 residents had abnormal fasting levels of glycaemia; on this basis, 20% of residents tested would be classified as having some degree of dysglycaemia based on FPG levels.

Twenty-one residents had HbA$_{1c}$ results above the normal range (4.2–6.1%). Of the

21 with elevated HbA_{1c}, three had a FPG positive for diabetes, three had a FPG in the impaired fasting glycaemia range, five more had a FPG in the ADA's revised diagnostic range and 10 had a normal FPG (*Figure 4*). Pearson's correlation shows a strong association between FPG and HbA_{1c} levels (r = 0.769; *P*<0.001). Even after the data for those diagnosed with diabetes were removed, the correlation was still significant (r = 0.516; *P*<0.001).

Discussion

This study has shown that the known prevalence of diabetes in care homes for older people in East Lincolnshire PCT increased from 9.7% to 12.7% over the 3-year period 2001–2004. This 3% increase in prevalence could be attributed to the assessment of older people needing assistance, with the emphasis on enabling more older people to manage at home. This will weight the population of care home residents in favour of people with diabetes, who will be admitted more frequently because of the presence of co-morbidities.

Known prevalence of diabetes in the care home residents might also have been influenced by the NSF for diabetes (Department of Health, 2001), which may have prompted the caring community to become more proactive and 'diabetes aware', thereby identifying residents at risk of having diabetes who might otherwise have continued to be undiagnosed.

Without active screening there is a reliance on cues for the presence of diabetes, such as reporting of osmotic symptoms. The reporting of symptoms did not relate to the level of glycaemia in the residents in this study, emphasising the unreliability of using symptoms as a cue for screening individual residents.

There is a perception that the use of insulin to control type 2 diabetes has greatly increased in recent years, yet this was not evident in this study. This may reflect a less intensive approach to diabetes management by healthcare professionals delivering diabetes care to residents of care homes.

It was hypothesised from previous studies that active screening would

uncover an actual prevalence of diabetes near to 20% in care homes. However, only three of the 100 residents screened were found to have diabetes by FPG results. This study was carried out in a rural PCT without a city population and participants were all Caucasian. Previous studies with higher diabetes prevalences were carried out in populations with different ethnic mixes and included inner-city populations (Sinclair et al, 2001). This would affect uncovered prevalence rates.

In addition, the study participants were very old (mean age 84 years). Research in older people often excludes those who are very old, and the epidemiology of diabetes in old age is not well understood. But type
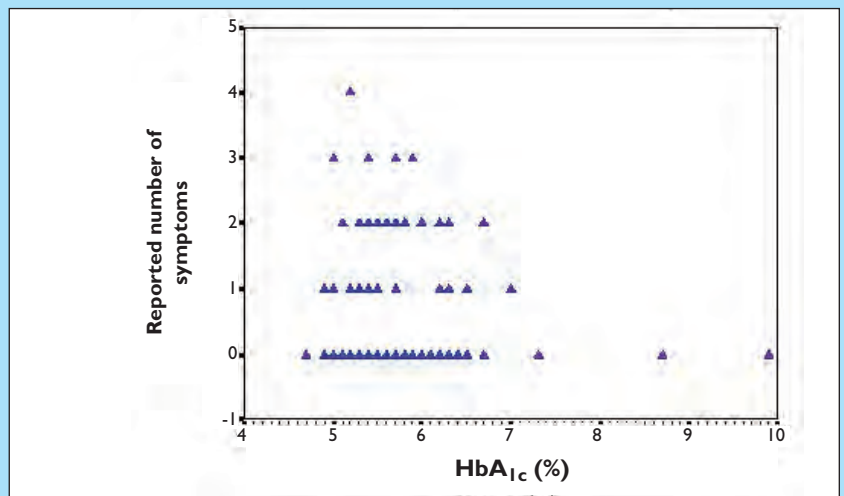

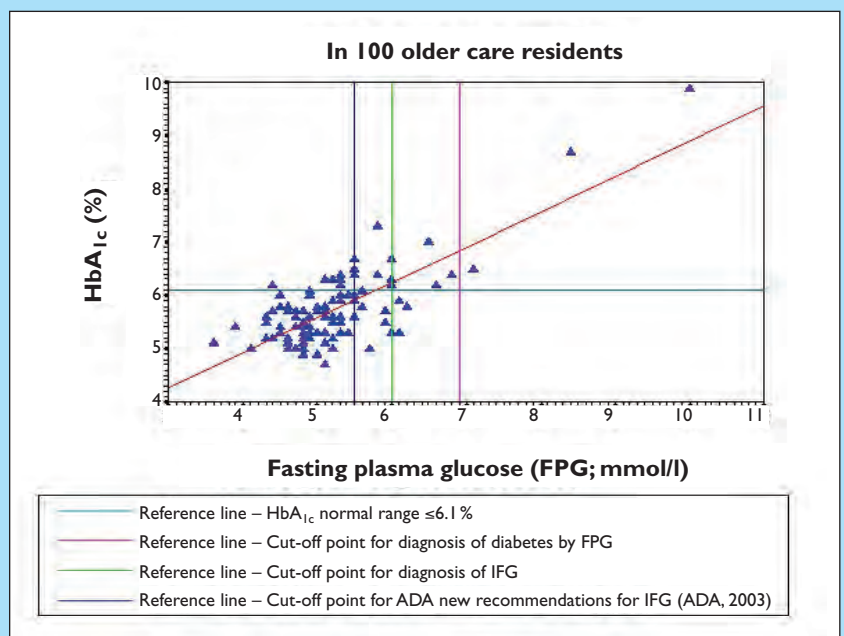Figure 3. Scatter graph showing the relationship between HbA_{1c} and symptoms.

Figure 4. Scatter graph showing the relationship between HbA_{1c} and fasting plasma glucose (IFG=impaired fasting glycaemia).

PAGE POINTS

1 The high proportion of care home residents with diabetes poses a challenge to staff and DSNs providing education and support.

2 This study suggests that waiting for cues to screen for diabetes in this high-risk population is futile.

3 Screening for diabetes at the time of admission would be beneficial, but the most effective method for screening remains unclear.

2 diabetes shortens life expectancy, so residents with type 2 diabetes may not live to very old age; prevalence is therefore likely to be lower in very old people.

Although only 3% of participants in this study were found to have a diagnosis of diabetes using FPG levels, 21% had an HbA$_{1c}$ above the normal range. Additional information from a 2-hour post-challenge blood glucose result would be required in these individuals to examine the significance of the elevated HbA$_{1c}$. However, it was difficult to obtain consent for an overnight fast, even though the researcher visited homes at 7am. Gaining consent for an OGTT would have been more restrictive.

Conclusion

A high proportion of residents in care homes have diabetes. This poses a challenge for care home staff and diabetes specialist nurses providing education and support to staff and residents. This study suggests that waiting for cues to screen for diabetes in this high-risk population is futile. Screening for diabetes at the time of admission to the home would be beneficial; however, the most effective method for screening remains unclear. ■

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