Prevalence of Diabetes in Care Home Residents

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OBJECTIVE — To determine the prevalence of known and undetected diabetes diagnosed either by an elevated fasting baseline sample or by a 2-h post–glucose load sample in a group of residents of care homes in an urban-district setting.

RESEARCH DESIGN AND METHODS — We completed individual interviews with patients and caregivers in 30 care homes (both residential and nursing homes) in two metropolitan districts of Birmingham, West Midlands, U.K. All care homes were under the supervision of primary care physicians (general practitioners). We carried out 75-g oral glucose tolerance tests (OGTTs) in consenting residents without previous known diabetes. Criteria for diagnosis of diabetes were obtained from the World Health Organization (1998) and the American Diabetes Association (1997).

RESULTS — Of 636 residents available for study, 76 residents (12.0%) were known to have diabetes; of the 560 remaining residents, 286 either refused to participate or were deemed too ill or unavailable to undergo testing. Complete data on 274 OGTTs were obtained (median age 83 years, range 45–101). A total of 46 subjects were diagnosed as having diabetes and 94 as having impaired glucose tolerance. Allowing for subjects who refused or were unable to participate, the calculated total prevalence (which includes known and newly detected diabetes) was 26.7% (95% CI 21.9–32.0). The calculated overall prevalence of impaired glucose tolerance was 30.2% (25.2–35.6).

CONCLUSIONS — In a group of care home residents not known to have diabetes and able to undergo testing, a substantial proportion have undetected diabetes based on a 2-h postglucose load. These residents warrant further study as they may be at higher cardiovascular risk and require an intervention.

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In the U.K., current care home practices do not include screening for diabetes either at the time of admission or subsequently thereafter. A view often expressed is that diabetes screening in older subjects is not justified, as the benefits of therapeutic intervention and life expectancy are substantially reduced (1). Nevertheless, a large proportion of residents newly diagnosed with diabetes are likely to have vascular complications that can deteriorate significantly during a 1–2 year period, which reflects their average duration of stay (2). In addition, undiagnosed diabetes in residential care may be a risk factor for the development of hyperosmolar nonketotic coma and increased mortality (3,4).

Few studies have investigated the prevalence of diabetes in residential care settings. In the U.S., the National Nursing Home Survey (5) estimated that 14.5% of nursing home residents had diabetes; of these residents, 75% were ≥74 years of age. A more recent study in a public long-term care facility in Rochester, NY, has suggested a prevalence of ~21% (6). In the U.K., two observational studies of residents in residential care have reported the prevalence of known diabetes to be 7.2 and 9.9%, respectively (2,7), but these studies may underestimate the true prevalence because they did not include objective testing of glucose tolerance. The differences in prevalence rates of known diabetes between the U.K. and the U.S. also reflect the well-recognized differences in the populations as a whole (8,9).

We therefore decided to investigate the prevalence of known and undetected diabetes diagnosed either by the fasting baseline sample or by the 2-h post–glucose load sample in a group of residents of care homes in an urban-district setting.

RESEARCH DESIGN AND METHODS

— Subjects were residents of care homes (nursing and residential) in two multiethnic districts of metropolitan Birmingham. Residential homes provide personal and social care only, and residents are usually mobile and continent. Residents in nursing homes have much higher levels of dependency and may have physical and mental disabilities: they require 24-h nursing care. A total of 37 care homes were potentially available for study within both districts, but 7 of them either refused or were unable to participate because of closure or refurbishment. In the 30 participating care homes, there was 92% occupancy, with 636 residents.

Detailed examination of medical records and treatment charts confirmed the presence of diabetes in 76 residents, giving a 12% prevalence of known diabetes. Subjects without a history of diabetes were considered for an oral glucose tolerance test (OGTT) that consisted of a 75-g anhydrous glucose load (115 ml Hycal), given after a confirmed overnight fast. Fasting and 2-h postchallenge capillary plasma glucose samples were taken and

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Abbreviations: IGT, impaired glucose tolerance; OGTT, oral glucose tolerance test.

A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.

Table 1—*Results of the OGTT carried out in 274 residents*

	2-h OGTT values (mmol/l)					
	<8.9	8.9–12.1	≥12.2	Diabetic	IGT	Total
Fasting capillary glucose (mmol/l)						
<6.1	133	91	30	30	91	254
6.1–6.9	1	3	7	7	3	11
7.0–7.7	1	2	2	5	6	5
≥7.8	0	0	4	4	0	4
Total	135	96	43	46	94	274

Data are *n*.

analyzed using a glucose-oxidase method. Confirmatory testing was not performed.

Data from the OGTTs were analyzed using World Health Organization (1998) (10) and American Diabetes Association (1997) (11) diagnostic criteria for fasting and 2-h capillary plasma samples. For capillary glucose levels, these are as follows: diabetes, fasting glucose ≥7.0 mmol/l or 2-h value ≥12.2 mmol/l; impaired glucose tolerance (IGT), fasting glucose <7.0 mmol/l and 2-h value 8.9–12.1 mmol/l; and impaired fasting glucose, fasting glucose 6.1–6.9 mmol/l and 2-h value <8.9 mmol/l (if measured) (Table 1) . The method used to calculate overall prevalence was based on our previous study (9). Assuming that subjects not tested had a prevalence of diabetes similar to those who were tested, it is possible to calculate the prevalence and 95% CIs for various categories of glucose intolerance for the entire population (9). A proportion of the known diabetic subjects equivalent to the ratio of "subjects tested to all samples eligible for testing" was added to the total tested sample, and this set of data was used for the denominator in the prevalence calculations in a standard fashion. The prevalence would be the same without this data manipulation, but this is necessary to give realistic 95% CIs. The alternative approach is to assume that all subjects not tested either had or did not have each of the diagnostic labels, which gives very wide (not 95%) CIs that encompass the true population prevalence but are too wide to be meaningful. The results are given in Table 2. These values were calculated using standard methods (Arcus Pro-Stats 3.25; Medical Computing, Aughton, U.K.). In view of the small numbers, subgroup analyses are not reported.

RESULTS — A total of 58 residents refused to consent to OGTT without providing a reason, and in another 227 cases, permission to participate was denied by the care home manager, the matron, or the next of kin on the basis of extreme frailty or acute illness. One resident died before the OGTT was undertaken. The demographic characteristics of consenting subjects were similar to those of the general care home population in the U.K. (12), and the authors were not aware of any obvious differences between subjects who consented and subjects who did not. Complete data on 274 OGTTs (median age 83 years, range 45–101) were available. There were 50 male white subjects (median age 79 years), 179 female white subjects (median age 86 years), 17 male nonwhite subjects (median age 72 years), and 28 female nonwhite subjects (median age 74 years).

The results of the 274 OGTTs are presented in Tables 1 and 2. The raw data presented in Table 1 shows that the majority of positive diagnoses for diabetes are derived from elevated 2-h glucose values ($n = 43$), and only three residents had a purely elevated fasting capillary value >7.0 mmol/l. The calculated total prevalence is reported in Table 2. The actual prevalence of known diabetes was 12.0%, whereas the calculated total prevalence (based on the method reported in reference 9) was 26.7%. The calculated overall prevalence of IGT was 30.2%. Only one subject had impaired fasting glucose according to the criteria previously stated. No significant differences were found between residential and nursing homes in prevalence rates of diabetes.

CONCLUSIONS — In this study of care homes, we found a 12% prevalence of known diabetes. This value is similar to figures reported in two previous studies of institutional settings in South Wales and North West England (2,7) and compares with a 6.0% prevalence rate in community-dwelling older subjects in the U.K. (9). By following OGTTs of approximately half of the remaining residents without known diabetes, it was calculated that at least one in four residents of residential and nursing homes meet diagnostic criteria for diabetes, and overall about one in two residents appear to have an abnormality of glucose tolerance. The particular problems of recruitment and consent for conducting research in long-term care settings have been widely acknowledged (13,14), and in our study, a large number of residents were unable to participate. However, the prevalence of diabetes among these subjects is unlikely (because of medical illness and/or frailty) to be lower than that of subjects tested. Indeed, we believe that we are more likely to have underestimated rather than overestimated the true prevalence of diabetes.

Based on fasting glucose level, the majority of residents tested would be classed as nondiabetic, but postchallenge hyperglycemia may have significance in defining a group of individuals at high cardiovascular risk, who may also have an elevated mortality rate, as recently dem-

Table 2—*Prevalence of diabetes with 95% CIs (where appropriate) in each category of glucose tolerance*

Category of glucose tolerance	Overall prevalence (%)	95% CI
Known diabetes	12	—
Newly detected diabetes	14.8	11.0–19.2
IGT	30.2	25.2–35.6
Normal	43.1	37.5–48.8
Total of known plus newly detected diabetes*	26.7	21.9–32.0

*Based on the method of calculation described by Croxson et al. (9).

onstrated in the DECODE study (15), which may be especially important in older subjects (16). The clinical significance of detecting IGT in this population of institutionalized subjects is uncertain, as is the relationship between these findings and the likely risk of microangiopathy. However, it is possible that residents with newly detected diabetes will benefit from early treatment of raised glucose levels by experiencing reduction of osmotic symptoms, improvement in cognition (17), and assessment of any vascular complications. Whereas these actions are unlikely to lead to an increase in life expectancy of diabetic residents, they may add some value to their quality of life.

Screening for diabetes in the absence of specific intervention data involving diabetic residents in care homes is currently unjustified in the absence of proven benefits. However, we do suggest that further studies be warranted, especially in view of the likelihood that a high prevalence of undetected diabetes is present.

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