RESEARCH

Association of age, sex and deprivation with quality indicators for diabetes: population-based cross sectional survey in primary care

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SUMMARY

Objectives To determine the quality of diabetes management in primary care after the publication of the National Service Framework and examine the impact of age, gender and deprivation on the achievement of established quality indicators.

Design Population-based cross sectional survey using electronic general practice records carried out between June–October 2003.

Setting Thirty-four practices in Wandsworth, South-West London, UK.

Participants 6035 adult patients (⩾18 years) with diabetes from a total registered population of 201 572 patients.

Interventions None.

Main outcome measures Success rates for the diabetes quality indicators within the General Medical Services contract for general practitioners.

Results We identified large variations in diabetes management between general practitioner practices with poorer recording of quality care in younger patients (18–44 years). In addition, younger patients had a worse cholesterol and glycaemia profile, although hypertension was more common in older patients. Gender and deprivation did not appear to be important determinants of the quality of care received.

Conclusions There are large variations in diabetes management between general practitioner practices, with care seemingly worse for younger adults. Longitudinal studies are required to determine whether current UK quality improvement initiatives have been successful in attenuating existing variations in care and treatment outcomes.

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INTRODUCTION

Diabetes has been identified as a national priority condition in the UK. Considerable investment has been made to improve the quality of clinical services for individuals with diabetes since 1997.[1] The National Service Framework for diabetes set out key quality standards to both improve the overall quality of services and address known variations in care.[2] Financial incentives to improve the management of chronic diseases such as diabetes in primary care were introduced in 2004 as part of the General Medical Services contract.

Early evidence indicates that these initiatives may have led to better management of diabetes in primary care; although the extent of improvement may have been more modest than that achieved for coronary heart disease.[3] In addition, recent studies highlight persisting variations in the quality of diabetes care being delivered. The General Medical Services quality indicators for diabetes have been shown to be less likely to be achieved for certain sectors of the population, for example in areas of high deprivation and high ethnic mix.[4] Gender differences have also been identified, with women less likely to have quality care indicators recorded for their diabetes than men.[4]

Reducing differential access to services and treatments across age-groups is clearly important in improving the management of diabetes in primary care.[5] Age inequalities have been identified in the secondary prevention of coronary heart disease, with older patients less likely to receive effective treatments than younger age-groups.[6,7] However, few recent studies have examined the relationship between age and the quality of care received for diabetes. We therefore examined associations between age, gender, deprivation and achievement of the General Medical Services quality indicators in adult diabetes patients in one primary care trust in South-West London.

METHODS

CONDUIT project

The CONDUIT (Cutting Out Needless Deaths Using Information Technology) programme began in 1998, and was initially piloted in the Battersea Primary Care Group in South-West London.

Since then the programme has established comprehensive diabetes and coronary heart disease registers within two localities in Wandsworth Primary Care Trust. The data collection period for the present study was June–October 2003. Ethical approval for the study was granted by Wandsworth Local Research Ethics Committee.

Setting and participants

The two localities contained 40 practices with a total registered population of 245 872. Thirty-four practices participated in the 2003 collection round, providing 82% coverage of the registered population. The population of Wandsworth is younger than that of England and Wales, with 74% under 45 years. One in five Wandsworth residents (22%) belongs to a non-white minority ethnic group and the borough has high levels of deprivation relative to elsewhere in England (index of multiple deprivation 2004[8] rankings: overall 128/354, income scale 51/354, employment scale 60/354).

Identification of diabetes patients

The methodology used to develop our disease register for diabetes in Wandsworth has been described previously.[9] In brief, all patients with type 1 and type 2 diabetes were identified from computerized records by searching diagnosis of diabetes (C10) or diabetes care (66A) Read codes. Patients with repeat prescribing for diabetic medications or with an HbA1c greater than 7.5% were also included in our sample. Patients under 18 years and women with gestational diabetes were then excluded. Female patients who had no other data relating to diabetes apart from metformin prescribing were excluded on the grounds that they were likely to be receiving treatment for polycystic ovarian syndrome rather than diabetes. Additional verification of the diagnosis of diabetes through hand searching of patient records was not feasible due to the large numbers involved.

Study variables

We examined quality indicators for diabetes from the General Medical Services contract as they applied to our population between June and October 2003. Each indicator is based on clinical information recorded on the practice computer within the previous 15 months.

Socio-economic status was assigned to individual patients based on their postcode using the Index of Multiple Deprivation 2004.[8] Patients were then grouped into quintiles, with those in quintile one residing in the most deprived areas and five in the least deprived areas.

Statistical analyses

We examined variation between general practitioner practices in achievement of each of the quality indicators for diabetes by calculating median values and 10th and 90th centiles. Logistic regression was undertaken to determine odds ratios, with 95% confidence intervals, for each quality indicator with age, gender and deprivation as the independent variables. We used robust standard errors to take account of the clustering of patients within general practices.[10] Statistical analyses were performed using STATA 9.1.

RESULTS

In 2003, 6035 adults ($\geqslant$18 years) were identified as having diabetes in the 34 participating practices: 3118 were men and 2917 were women. The European age-standardized prevalence of diabetes per 1000 population in all age-groups was 34.5 for females and 38.1 for males. Nearly 70% of patients were aged 55 years or older (18–44 years [16.6%], 45–54 years [15.2%], 55–64 years [24.7%], 65–74 years [26.6%], 75+ years [16.9%]).

The median practice achievement for blood pressure and haemoglobin A1c (HBA1c) recording were 83.6% and 73.0%, respectively. However, practice achievement of treatment targets was much lower, at 46.2% for HbA1c $<$7.5 and 58.3% for blood pressure $\leqslant$145/85. Considerable between practice variation was evident in the achievement of quality indicators (Table 1).

Age

Process measures of quality care (Tables 2 and 3) were significantly less likely to be recorded in young adult patients (18–44 years) than in older age-groups. Patients aged 18–44 years were significantly less likely to meet the General Medical Services treatment targets for cholesterol and HbA1c but had better blood pressure control than older patients (Tables 4 and 5).

Gender

Recording of quality care indicators was broadly similar in men and women. However, women were significantly more likely to be asked about their smoking status than men, but less likely to receive cessation advice if they were smokers.

Women were significantly more likely to have cholesterol levels above 5 mmol/L but there was no significant difference between women and men in terms of meeting General Medical Services targets for HBA1c control and blood pressure.

Table 1 **Interpractice variation on diabetes quality indicators (%)**

	Median	10th centile	90th centile
Diabetes care measures			
Body mass index measured	71.9	23.4	85.5
Smoking status determined	64.3	37.8	81.9
Smoking advice provided	50.5	11.8	76.2
Hb1Ac measured	73.0	30.8	82.9
Blood pressure measured	83.6	50.0	94.0
Retinal screening undertaken	36.8	6.3	62.2
Pulses measured	43.8	4.5	68.5
Cholesterol measured	69.4	20.4	82.8
Micro-albuminuria measured	1.0	0.0	32.6
Creatinine measured	72.5	26.9	88.3
Flu jab administered	56.0	37.3	69.1
Outcome measures			
HbA1c $\leqslant$7.4	46.2	31.3	58.0
HbA1c $\leqslant$10	89.2	84.4	93.5
Cholesterol $\leqslant$5	56.3	48.1	68.8
Blood pressure $\leqslant$145/85	58.3	46.5	68.9

Deprivation

Recording of quality care indicators was similar in patients within the most and least deprived groups in our sample. Patients in the most deprived group were less likely to meet the General Medical Services target for blood pressure control and more likely to have HbA1c $>$10% than those in the least deprived groups. However, these differences did not attain statistical significance.

DISCUSSION

Principal findings

We identified large variations in diabetes management between general practitioner practices with poorer recording of quality care in younger patients (18–44 years). In addition, younger patients have a worse cholesterol and HBA1c profile, although blood pressure control was better than in older patients. Gender and deprivation did not appear to be important determinants of the quality of care received for most of the indicators. However, control of cholesterol was found to be significantly worse in women.

Strengths and weaknesses of this study

We identified considerable patient group and practice level variation in the achievement of the General Medical Services quality indicators. Some of this variation may be due to differences in recording practice, rather than the actual differences in the quality of care received. Variations in recording practice in primary care should be gradually eliminated now that the General Medical Services contract has been implemented and general practices are being paid based on the information they are recording.

Table 2 **Processes of care recorded in all practices (%)**

	Body mass index measured	Smoking status determined	Smoking advice provided	HbA1c measured	Blood pressure measured	Retinal screening undertaken	Pulses measured	Cholesterol measured	Micro-albuminuria measured	Creatinine measured
Age										
18–44	50.7	52.2	28.7	44.5	65.1	23.9	25.3	39.2	7.2	40.9
45–54	64.5	62.1	46.4	62.0	76.3	34.4	42.0	57.8	10.0	60.7
55–64	69.5	64.0	46.9	69.1	83.6	40.1	47.8	67.3	9.9	68.3
65–74	70.5	64.7	48.9	67.8	84.0	40.3	47.7	67.3	9.7	70.1
75+	66.7	67.8	38.5	66.0	82.5	36.4	46.4	66.0	11.1	74.0
Gender										
Male	65.8	58.5	46.1	63.5	78.5	35.4	42.7	61.5	9.4	63.2
Female	65.0	66.9	35.2	62.6	80.3	36.6	43.2	60.4	9.8	64.9
Deprivation*										
1	71.3	66.4	47.2	68.4	83.8	38.0	44.6	64.9	12.1	69.0
2	60.9	60.1	39.8	57.9	75.2	34.5	40.2	56.0	10.7	59.7
3	65.4	62.2	40.0	62.7	81.0	35.7	43.9	59.3	10.0	62.5
4	64.7	62.6	42.4	64.0	78.8	37.1	42.6	61.5	7.5	62.4
5	64.7	61.6	39.4	62.3	78.0	34.6	43.4	63.0	7.6	66.6

*1=most deprived, 5=least deprived

Table 3 **Processes of care recorded in all practices (odds ratios and 95% confidence intervals for logistic regression models)**

	Body mass index measured	*Smoking status determined*	*Smoking advice provided*	*HbA1c measured*	*Blood pressure measured*	*Retinal screening undertaken*	*Pulses measured*	*Cholesterol measured*	*Micro-albuminuria measured*	*Creatinine measured*
Age										
18–44	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
45–54	1.77 [1.35, 2.33]	1.52 [1.11, 2.09]	2.05 [1.20, 3.50]	2.04 [1.29, 3.23]	1.74 [1.21, 2.50]	1.67 [1.15, 2.44]	2.14 [1.52, 3.02]	2.13 [1.32, 3.44]	1.43 [0.91, 2.26]	2.24 [1.45, 3.48]
55–64	2.21 [1.55, 3.17]	1.64 [1.20, 2.26]	2.11 [1.20, 3.70]	2.80 [1.71, 4.59]	2.75 [1.86, 4.09]	2.14 [1.42, 3.22]	2.70 [1.80, 4.06]	3.20 [1.86, 5.50]	1.40 [0.89, 2.18]	3.13 [1.80, 5.45]
65–74	2.34 [1.59, 3.44]	1.70 [1.19, 2.41]	2.32 [1.31, 4.12]	2.66 [1.64, 4.30]	2.85 [1.82, 4.47]	2.15 [1.44, 3.21]	2.70 [1.84, 3.96]	3.23 [1.92, 5.42]	1.37 [0.83, 2.26]	3.42 [2.08, 5.64]
75+	1.90 [1.28, 3.07]	1.90 [1.23, 2.94]	1.56 [0.78, 3.11]	2.47 [1.40, 4.36]	2.55 [1.54, 4.23]	1.83 [1.14, 2.92]	2.56 [1.57, 4.20]	3.07 [1.76, 5.36]	1.59 [0.90, 2.82]	4.16 [2.40, 7.19]
Gender										
Male	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Female	0.97 [0.83, 1.13]	1.43 [1.22, 1.68]	0.66 [0.49, 0.90]	0.96 [0.83, 1.12]	1.12 [0.97, 1.30]	1.06 [0.94, 1.19]	1.02 [0.91, 1.15]	0.95 [0.82, 1.10]	1.04 [0.90, 1.21]	1.07 [0.87, 1.30]
Deprivation*										
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	0.62 [0.45, 0.86]	0.75 [0.53, 1.06]	0.76 [0.38, 1.51]	0.62 [0.45, 0.87]	0.58 [0.36, 0.93]	0.86 [0.62, 1.19]	0.83 [0.63, 1.08]	0.67 [0.50, 0.91]	0.86 [0.48, 1.55]	0.64 [0.44,0.94]
3	0.76 [0.55, 1.04]	0.82 [0.61, 1.10]	0.76 [0.37, 1.56]	0.78 [0.60, 1.02]	0.82 [0.56, 1.21]	0.91 [0.71, 1.17]	0.98 [0.78, 1.22]	0.78 [0.62, 1.00]	0.81 [0.47, 1.37]	0.73 [0.52, 1.03]
4	0.75 [0.52, 1.09]	0.86 [0.62, 1.18]	0.86 [0.43, 1.72]	0.85 [0.61, 1.17]	0.74 [0.46, 1.20]	0.99 [0.73, 1.33]	0.95 [0.71, 1.27]	0.90 [0.67, 1.22]	0.60 [0.30, 1.19]	0.77 [0.50, 1.17]
5	0.73 [0.48, 1.12]	0.80 [0.55, 1.17]	0.74 [0.38, 1.45]	0.76 [0.52, 1.12]	0.68 [0.39, 1.19]	0.87 [0.61, 1.24]	0.96 [0.66, 1.38]	0.92 [0.65, 1.31]	0.60 [0.30, 1.18]	0.89 [0.60, 1.32]

*1=most deprived, 5=least deprived

Table 4 **Achievement of intermediate outcome indicators (%)**

	Serum cholesterol ⩽5 mmol/L	*Blood pressure ⩽145/85*	*HbA1c ⩽7.4%*	*HbA1c ⩽10%*
Age				
18–44	54.2	75.2	39.0	86.6
45–54	53.7	57.9	46.1	85.6
55–64	56.0	55.1	43.0	87.1
65–74	59.6	57.6	49.8	89.7
75+	59.8	54.2	58.6	93.5
Gender				
Male	62.1	59.7	47.3	88.6
Female	51.9	57.8	48.2	88.7
Deprivation*				
1	57.3	55.9	45.3	86.4
2	55.8	59.9	48.1	88.8
3	61.2	59.2	48.4	88.6
4	53.6	59.7	48.7	90.4
5	58.2	59.4	48.3	89.2

*1=most deprived, 5=least deprived

Patients with diabetes were identified from computerized records using algorithms based upon diagnostic and diabetes care codes. We have previously shown that computer searches based on diagnostic Read codes for diabetes alone have a low sensitivity, as they may miss up to a third of cases.[9] We used a more comprehensive search strategy to compensate for this under-recording of diabetes. All but six general practitioner practices within the study area participated in our survey. Hence our findings provide a comprehensive and typical picture of the care provided in this diverse, inner city location.

Comparison with previous studies

Few recent studies have examined the relationship between age and the quality of overall diabetes care received. Our findings confirm previous research which has shown that ageing is associated with improved glycaemic control,[11–13] but an increased likelihood of hypertension.[14,15] Our findings are also consistent with the recent National Diabetes Audit in England,[16] which suggested that older patients may be more likely to achieve cholesterol treatment targets. These differences may reflect tighter management policies for older patients within practices and better treatment compliance amongst this patient group. Patients aged 75+ years did not appear to receive poorer quality care when compared to younger patients. This finding contrasts with recent evidence of persistent age inequalities in the secondary prevention of coronary heart disease.[6,7]

Our findings confirm recent research which suggests that glycaemic control may be similar in women and men,[4,11] but that women with diabetes are more likely to have poorly controlled cholesterol.[4] Intermediate treatment outcomes were not significantly different amongst participants living in deprived areas compared with those living in

Table 5 **Achievement of intermediate outcome indicators (odds ratios and 95% confidence intervals for logistic regression models)**

	Serum cholesterol ⩽5 mmol/L	*Blood pressure ⩽145/85*	*HbA1c ⩽7.4%*	*HbA1c ⩽10%*
Age				
18–44	1.00	1.00	1.00	1.00
45–54	0.99 [0.76, 1.28]	0.45 [0.36, 0.57]	1.34 [1.05, 1.70]	0.92 [0.62, 1.36]
55–64	1.10 [0.88, 1.36]	0.40 [0.33, 0.49]	1.18 [0.93, 1.49]	1.05 [0.76, 1.43]
65–74	1.27 [1.04, 1.55]	0.44 [0.36, 0.55]	1.55 [1.23, 1.96]	1.36 [0.99, 1.87]
75+	1.32 [1.04, 1.69]	0.39 [0.30, 0.51]	2.21 [1.68, 2.90]	2.22 [1.37, 3.61]
Gender				
Male	1.00	1.00	1.00	1.00
Female	0.65 [0.56, 0.75]	0.93 [0.83, 1.04]	1.00 [0.89, 1.13]	0.97 [0.78, 1.21]
Deprivation*				
1	1.00	1.00	1.00	1.00
2	0.93 [0.76, 1.14]	1.21 [1.03, 1.42]	1.08 [0.88, 1.32]	1.21 [0.93, 1.57]
3	1.16 [0.99, 1.37]	1.16 [0.98, 1.37]	1.11 [0.93, 1.33]	1.20 [0.90, 1.60]
4	0.86 [0.71, 1.04]	1.16 [0.96, 1.41]	1.15 [0.94, 1.40]	1.49 [1.09, 2.03]
5	1.02 [0.81, 1.28]	1.18 [0.92, 1.52]	1.10 [0.87, 1.38]	1.27 [0.97, 1.65]

*1=most deprived, 5=least deprived

more affluent areas. Existing evidence on the association between socio-economic status glycaemic control is mixed[4,11,17] but may be influenced by definitions used as well as the choice of measurement tool.[18] Our findings differ from that of Hippisley-Cox *et al.*,[4] who found that women and patients living in deprived areas may receive less comprehensive care for their diabetes. The comprehensive diabetes disease management programme being implemented in Wandsworth and the regular monitoring of practice performance may have helped to attenuate gender and socio-economic differences in the quality of care for diabetes in this locality.

The European age-standardized prevalence of diabetes per 1000 population in all age-groups was 34.5 for females and 38.1 for males, which is higher than that reported in previous population based surveys.[16,19] This is not unexpected given that our study population was characterized by a relatively high proportion of individuals from minority ethnic and deprived groups, who are known to experience elevated rates of diabetes.[2]

CONCLUSIONS AND FUTURE RESEARCH

There is scope to improve the management of diabetes in all age-groups, particularly in younger patients, and address between practice variations in care. Failure to improve diabetes care in younger patients, many of whom will be from ethnic minorities, may lead to an increase in the major complications of diabetes, such as renal failure and peripheral vascular disease, in future years.[20] Finally, longitudinal studies are required to determine whether current UK quality improvement initiatives are successful in attenuating existing variations in care and treatment outcomes.

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