

Are there disparities in care in people with diabetes? A review of care provided in general practice

Ross Lawrenson MD, FRCGP, FFPH, FAFPHM; Veronique Gibbons BSc (Hons), MSc; Grace Joshy MSc; Peter Choi

Waikato Clinical School
The University of Auckland
Hamilton, New Zealand

ABSTRACT

AIM: To estimate the prevalence of diabetes by age, gender and ethnicity; to look at quality of care and to investigate disparities in care.

METHOD: A cross-sectional study in three practices in Hamilton. A comprehensive register was generated by identifying patients with diabetes through queries on the practices' computer system looking for diagnosis codes for diabetes, prescription of hypoglycaemic agents, participation in the 'Get Checked' programme or laboratory test for HbA1c. We then compared the glycaemic control and uptake of retinal screening in adult patients with Type 2 diabetes.

RESULTS: The overall prevalence of diabetes in patients aged 20 years or older was 1221/26 096 (4.7%). Eighty percent had attended for a 'Get Checked' annual review in the last 12 months. After adjusting for age, we found that Maori, males and those diagnosed more than five years ago were at increased risk of having unsatisfactory glycaemic control. Maori or Asian patients and women appeared less likely to have accessed retinal screening in the last two years.

DISCUSSION: Computerised records including diagnostic codes and prescriptions in general practices can be used to develop comprehensive diabetes registers. Whilst this study shows that high levels of annual review can be achieved in patients with diabetes, the next challenge is to tackle the disparities in uptake of services such as retinal screening or the achievement of intermediate outcomes such as good glycaemic control.

KEYWORDS: Diabetes mellitus; prevalence; health care disparities; ethnic groups; primary health care

Introduction

The 'Get Checked' annual diabetes programme is aimed at ensuring all patients with diabetes are reviewed at least annually and have a consistent quality management.¹ It is known that Maori and patients from ethnic minorities with diabetes have poorer outcomes due to the complications of diabetes.^{2,3} Any programme aimed at improving quality of care must be careful not to increase disparities by concentrating efforts on those with least risk of complications at the expense

of harder to reach patients. There is concern that the 'Get Checked' programme in Waikato is only reaching 69% of the estimated number of patients and that only 35% of Maori are receiving a review.⁴ We know from a previous study that Maori and Asian patients with diabetes who have attended a 'Get Checked' review are less likely to return for a subsequent review.⁵

Government targets for diabetes⁶ to be measured across ethnic groups include:

J PRIMARY HEALTH CARE
2009;1(3):177-183.

CORRESPONDENCE TO:

Ross Lawrenson
Head of the Waikato
Clinical School and
Professor of Primary Care,
Peter Rothwell Academic
Centre, Waikato Hospital,
PB 3200, Hamilton 3240,
New Zealand
Lawrensr@waikatodhb.
govt.nz

- To increase the proportion of people with diagnosed diabetes who have a free annual diabetes check.
- To increase the proportion of people on the diabetes register who have satisfactory or better diabetes management (satisfactory management is defined by the Ministry of Health as a HbA1c < 8%).
- To increase the proportion of people on the diabetes register who have had retinal screening in the preceding two years.

One of the barriers with the 'Get Checked' programme is that District Health Boards do not have comprehensive diabetes registers and so have difficulty ascertaining exactly what proportion of patients with diabetes have attended a 'Get Checked' review.⁷

Our aim was to estimate the prevalence of diabetes in three large general practices by age, gender and ethnicity; to look at quality of care and to investigate disparities in care. The null hypothesis to be tested is that there is no difference in HbA1c or uptake of retinal screening between ethnic groups.

Methods

We carried out a cross-sectional study in three general practices in Hamilton, New Zealand. Our first task was to develop a comprehensive register of patients with diabetes. We restricted the study to patients aged 20 years or over and those with Type 2 diabetes mellitus. All three practices managed their patient files through the MedTech-32 programme. Through the query builder search we found our total practice population to be 36 387. We used the practice's computer system search facility to identify:

1. Patients under the Read codes 'C108' (insulin-dependent diabetes mellitus) and 'C109' (non-insulin-dependent diabetes mellitus). This represents all the patients coded with diabetes.
2. Patients who have in the past 12 months (between 15/11/2006 and 15/11/2007) been on any of the following drugs: Insulin, Metformin, Sulphonylureas, Acarbose, Glitazones. This represents all patients who have been prescribed diabetic medication in

the past 12 months, some of whom may not have been coded with diabetes.

3. Patients registered under the 'Get Checked' programme with their demographic and clinical information.
4. Patients who have had an HbA1c test ordered in the past two years (between 15/11/2005 and 15/11/2007). This represents all patients who have had an HbA1c test requested by their GP but who may not have been coded with diabetes (or been prescribed with diabetic medication).
5. The records were checked against the Waikato Regional Diabetes Service database using patient NHI numbers to see if there were any patients known to the hospital service not identified using our search strategy.

The data collected from the first stage were collated using Microsoft Excel. NHI numbers were collated to form a single list of all potential patients with diabetes for each practice. Patients with a diagnostic code for diabetes, who were also recorded on the WRDS database as having diabetes and had a record of a 'Get Checked' review in the last year, were presumed to be true cases. No further verification of the diagnosis was carried out in these patients. Patients who had a diagnostic code but no evidence of a diabetes annual review or a relevant prescription had their written records reviewed and had to meet the WHO diagnostic criteria for diabetes⁸ or have a letter from a specialist confirming the diagnosis before being accepted as validated cases. Those with a diagnostic code but where the diagnosis could not be confirmed were excluded. Similarly we reviewed the case records of patients without a diagnostic code for diabetes but with either a prescription for a hypoglycaemic agent or a record of an HbA1c \geq 6.5%. Again these patients had to have evidence that they met the diagnostic criteria for diabetes or have a letter from a specialist before being included. A cut-off of 6.5% was chosen, as evidence from unpublished local data suggested this was a relatively specific cut-off point. This is also consistent with evidence from another New Zealand study.⁹ We attempted to retrieve missing data from those who were not registered under the 'Get Checked' programme by checking individual patient records. The completed list consisted of all patients with con-

firmed diabetes, with demographic, clinical and laboratory information.

The demographic and clinical data that was collected included age, gender, ethnicity, height, weight, latest HbA1c and any record of retinal screening. Ethnicity was that recorded on the practice system.

Ethical approval for this study was granted by the Northern Y Regional Ethics Committee (Reference NTY/07/66/exp).

Statistical analysis

Marginal logistic regression model was used to analyse retinal screening rates and glycaemic control, adjusting for the correlation between patients from the same practice. Data were analysed using SAS® V.9. As retinal screening is only carried out every two years in the Waikato, patients who had been diagnosed in the last two years were excluded from the analysis of retinal screening uptake.

Results

We identified 26 096 patients aged 20 years and older who were registered with the three Hamilton practices at the time of the study. Of these 21 378 had been categorised as NZ Europeans (81.9%), 1996 (7.6%) as Maori, 1491 (5.7%) Asian and 392 (1.5%) Pacific. We validated 1221 patients with diabetes aged 20 years and over. Of these, 147 (12%) were Maori, 115 (9.4%) were Asians and 25 (2.1%) were Pacific (due to the small number of Pacific patients in this study separate findings are not presented). NZ European and 'Other' accounted for 934 (76.5%) of the population with diabetes. Of 110 patients (9.0%) with Type 1 diabetes, 99 were NZ Europeans.

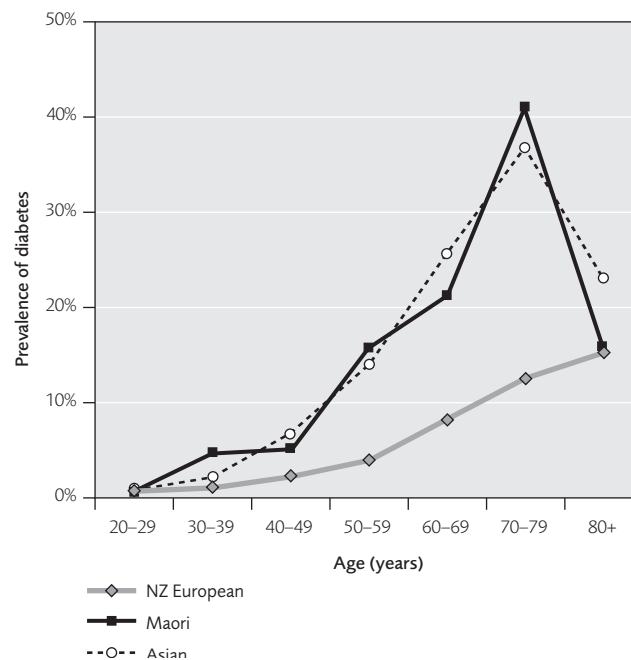
Overall we found 1251 potential patients with diabetes. One thousand two hundred and seven patients were coded as having diabetes. Of these, 198 had no record of 'Get Checked' in the last 12 months and, after review of their notes, 10 were excluded because they did not meet the diagnostic criteria for diabetes. Another 10 potential patients were identified from prescriptions for

WHAT GAP THIS FILLS

What we already know: Maori and patients from ethnic minorities with diabetes have poorer outcomes due to the complications of diabetes.

What this study adds: This study adds to the information we have on differences between ethnic groups in the management of diabetes in general practice. In particular it looks at the demands of the national diabetes annual review and examines the differences between Maori, Asians and NZ Europeans.

Figure 1. Age specific prevalence of diabetes by ethnicity in the three Hamilton practices



hypoglycaemic medications and, of these, three were confirmed as having diabetes. Of 17 extra patients identified from laboratory results with an HbA1c result >6.5%, four were confirmed as having diabetes. Eighty-six percent of patients with diabetes identified in the practices were also present on the Waikato Regional Diabetes Service (WRDS) register. Seventeen patients were found on the WRDS register that were not found through searching the practice systems for either diabetes codes or other evidence such as prescriptions. Thus a search of the three general practice computer system for diagnostic Read codes for diabetes had a sensitivity of 98.0% and a specificity of 99.9%.

Table 1. Glycaemic control and retinal screening rates among patients with Type 2 diabetes, n (%)

	Type 2 diabetes	HbA1c recorded	HbA1c ≤ 8%	Retinal screening recorded	Retinal screening in the last 2 years	
					All patients	Excluding newly diagnosed [†]
	1111	1012 (91.1%)	763 (75.4%)	967 (87.0%)	708 (63.7%)	65%
Ethnicity						
European	811	758 (93.5%)	604 (79.7%)	726 (89.5%)	547 (67.4%)	69%
Maori	141	123 (87.2%)	74 (60.2%)	112 (79.4%)	71 (50.4%)	54%
Asian	111	90 (81.1%)	62 (68.9%)	87 (78.4%)	61 (55.0%)	53%
Age (years)						
20–40	64	49 (76.6%)	33 (67.3%)	45 (70.3%)	31 (48.4%)	45%
40–60	356	316 (88.8%)	212 (67.1%)	301 (84.6%)	213 (59.8%)	61%
60+	691	647 (93.6%)	518 (80.1%)	621 (89.9%)	464 (67.1%)	69%
Gender						
Male	566	521 (92.0%)	369 (70.8%)	496 (87.6%)	369 (65.2%)	68%
Female	545	491 (90.1%)	394 (80.2%)	471 (86.4%)	339 (62.2%)	62%
Year diagnosed						
Last 2 years	127	126 (99.2%)	99 (78.6%)	97 (76.4%)	67 (52.8%)	
Last 3–5 years	272	270 (99.3%)	228 (84.4%)	249 (91.5%)	188 (69.1%)	69%
Before 5 years	554	549 (99.1%)	385 (70.1%)	545 (98.4%)	389 (70.2%)	70%
Missing	158	67 (42.4%)	51 (76.1%)	76 (48.1%)	64 (40.5%)	41%
Practice						
1	330	284 (86.1%)	218 (76.8%)	283 (85.8%)	165 (50.0%)	52%
2	467	444 (95.1%)	330 (74.3%)	424 (90.8%)	324 (69.4%)	70%
3	314	284 (90.4%)	215 (75.7%)	260 (82.8%)	219 (69.7%)	71%

[†] Excluding those diagnosed in the last two years.

HbA1c: Glycosylated haemoglobin A1c

The overall prevalence of diabetes in the population aged 20 years plus in these three Hamilton practices was 1221/26 096 (4.7%). The prevalence of diabetes increased with age and was substantially higher in Maori and Asian patients than for NZ Europeans. (See Figure 1)

Of all the patients found to have diabetes, 79.9% had a 'Get Checked' annual review in the last 12 months. Maori and Asian patients were just as likely to have had a 'Get Checked' as NZ Europeans: NZ Europeans 726/910 (79.8%), Maori 121/147 (82.3%), Asian 89/115 (77.4%) ($p=0.61$). Patients with Type 1 diabetes were less likely to have attended than those with Type 2 diabetes.

We assessed the quality of diabetes care in patients categorised as having Type 2 diabetes. We looked at the proportion of patients with satisfactory glycaemic control (i.e. HbA1c ≤ 8%) and retinal screening rates; overall and within subgroups of age, gender, ethnicity and the years since diagnosis (Table 1).

Odds ratios for unsatisfactory glycaemic control, adjusting for age, showed that patients of Maori ethnicity, male gender and those diagnosed more than five years before were at increased risk (Table 2). Adjusted odds ratios from a similar logistic regression model (excluding patients diagnosed in the last two years) suggested that patients

of Maori or Asian ethnicity or female gender were more likely to have problems with access to retinal screening. Year of diagnosis was not a predictor for access to retinal screening and was dropped from the model.

Discussion

This study showed that a search of computerised general practice records using diagnostic codes can provide a comprehensive diabetes register. Looking for patients identified from prescriptions or laboratory data only produced another seven cases, whilst combining the register with a hospital database found another 17. This suggests the completeness of the general practice data can be high (98%) and in these practices is better than the 90% quoted in other studies.¹⁰ At the same time the Waikato Regional Diabetes Service identified 86% of patients known to the general practices; the majority of missing patients being newly diagnosed who had not been referred for retinal screening or other assessments. This figure is similar to our findings in a rural Waikato town where the hospital register identified 91% of patients.¹¹

The three practices involved in this study were larger than average, had a smaller proportion of Maori patients than is the norm for Hamilton City (Census 2001), but had a substantial number of patients of Asian origin. Indeed at the last census almost 10% of Hamilton city identified themselves as Asian. Thus, whilst acknowledging the special place of Maori as tangata whenua, it is also important to recognise the growing needs of Asian patients. Asian people in New Zealand are not a single cultural entity, but made up of distinct communities, each with its own unique health needs.¹² The Ministry of Health has recognised the diversity that exists within the 'Asian' population by separating Chinese, Indian and 'Other Asian' ethnic group in the *Asian Health Chart Book*.¹³ In particular the risks for South Asians has been identified because they have similar rates of diabetes to Maori and are prone to the increased risk of macrovascular disease.¹⁴ We found that the prevalence of diabetes in the Hamilton Asian population was similar to that found in Maori although it is a heterogeneous group including Chinese, Indian and other ethnicities.

In future we suggest that South Asian patients are identified separately from Asians of Chinese, Japanese, Korean and related ethnic background as recommended by the Ministry of Health. It should be acknowledged that there are problems with the accuracy of ethnicity recording within the health services in general. If the nationally instituted diabetes annual review is to report its outcomes for different ethnic groups then attention will need to be given to the accuracy and completeness of ethnicity recording in general practice. Because of the nature of the practices and the Hamilton population, the results of this study may not be directly generalisable to New Zealand as a whole. However its advantages are that the sample size is greater than most other studies from which the prevalence of diabetes has been derived, e.g. New Zealand household survey, and we have age, gender and ethnic specific data which allows comparisons with populations with different demographic characteristics.

The practices involved in this study had screened 80% of their patients with diabetes in the last 12 months. This demonstrates that a high uptake of 'Get Checked' can be achieved if practices have good systems. Furthermore, an equal proportion

Table 2. Adjusted odds ratios for unsatisfactory glycaemic control and poor access to retinal screening

	OR of HbA1c>8% (95% CI)	OR of no retinal screening in the last 2 years† (95% CI)
Ethnicity		
Maori	1.78 (1.33–2.39)*	1.31 (0.96–1.79)
Asian	1.53 (1.33–1.76)*	1.20 (0.97–1.47)
Other	2.73 (2.15–3.49)*	1.29 (0.92–1.81)
European	1	1
Gender		
Male	1.78 (1.33–2.39)*	1
Female	1	1.31 (0.96–1.79)
Diagnosed		
Within last 5 years	1	–
>5 years ago	2.71 (2.41–3.06)*	–

* p<0.05

† excluding those diagnosed in the last two years.

OR: Odds Ratio

CI: Confidence intervals

of Maori and Asian patients were attending 'Get Checked' compared with NZ Europeans which indicated that involvement of patients from ethnic minorities was not a problem in these practices. This suggests that the low uptake of 'Get Checked' in Maori patients with diabetes in the Waikato may be a function of how individual practices work. Rather than blaming Maori patients for the poor attendance rates, perhaps we could look at ways of improving the systems in our practices where the overall uptake is poor.

Despite equal uptake with 'Get Checked', disparities were evident in the control of diabetes by age, gender and ethnicity when using HbA1c >8 as an outcome measure. This is consistent with an audit from South Auckland¹⁵ but in contrast to another study where there was no

know that beta cell function deteriorates over time¹⁷ so it is difficult for practices to improve an individual's glycaemic control with oral hypoglycaemic medication alone. One way of preserving beta cell function is to ensure good control of diabetes from an early stage in the disease.¹⁸ This can be achieved with intensive management as shown by Smith et al. in Masterton using a structured programme and additional funding to ensure access for high risk patients.¹⁹ Our study used a cross-sectional design. It is important to monitor glycaemic control in individuals over time to ensure optimum outcomes. Measuring population-based mean HbA1c or the proportion of patients with 'unsatisfactory' control can be deceptive—particularly if screening or intensive case-finding increases the proportion of newly diagnosed

Whilst acknowledging the special place of Maori as tangata whenua it is also important to recognise the growing needs of Asian patients. Asian people in New Zealand are not a single cultural entity, but made up of distinct communities, each with its own unique health needs

difference in mean HbA1c between Maori and non-Maori.¹⁶ It would be interesting to know whether the differences we found were due to disparities in the care received or due to differences relating to the individual patient's ethnicity, socioeconomic position or environment. We would suggest that practices should give more attention to the glycaemic control in males, younger patients and those of Maori and Asian background. For instance, whilst we did not look at the use of insulin in patients with Type 2 diabetes there may be disparities that practices can address by encouraging patients with poorly controlled diabetes to use insulin. It may well be necessary to treat high risk patients more aggressively if inequalities in outcome are to be reduced.

We also noted that increasing length of time with diabetes equated to poorer control. We

patients on a practice register. Ultimately more discriminatory measures than simply the proportion of all patients with a HbA1c ≤ 8 mmol/L will be needed to demonstrate the quality of care provided by a practice.

This study also suggested that there are disparities in access to retinal screening, i.e. Maori and Asian patients seemed less likely to access screening. The Waikato DHB has had a long-standing and well-organised retinal screening programme that was first piloted in the early 1990s.²⁰ The programme recalls patients on a two-yearly cycle (although sometimes this can stretch a little over the two years depending on the workload). It was noted in 2003 that Maori were less likely to be screened than NZ Europeans.²¹ We know from this study that over 85% of patients had ever been screened, but in the last two years only 67% of NZ Europeans, 50%

of Maori and 55% of Asian had attended for retinal screening. This suggests that there are continuing disparities for Maori and strategies are needed to try to address this if disparities in blindness due to diabetic eye disease are to be avoided for Maori and Asian patients.

Overall we believe the practices that we studied have demonstrated good systems and care for their patients with diabetes. The detailed analysis indicates where further efforts could best be aimed. We have demonstrated that it is possible to develop comprehensive diabetes registers in general practice that good systems can ensure equal uptake of the 'Get Checked' annual review but that more effort is needed in trying to ensure equitable management of glycaemic control and retinal screening—two of the government's key targets. We believe our findings will be of interest to all general practices in their efforts to meet the demands of the 'Get Checked' programme including the reporting of data for different ethnic groups.

References

1. DHB Toolkit—Diabetes: To reduce the incidence and impact of diabetes. Wellington: Ministry of Health; 2001.
2. Joshy G, Simmons D. Epidemiology of diabetes in New Zealand: Revisit to a changing landscape. *NZ Med J* 2006;119(1235).
3. Tomlin A, Tilyard M, Dawson A, Dovey S. Health status of New Zealand European, Maori, and Pacific patients with diabetes at 242 New Zealand general practices. *N Z Med J* 2006;119(1235):U2004.
4. Health Needs Assessment & Analysis. HNA 2008. Hamilton: Waikato District Health Board; 2008.
5. Joshy G, Lawrenson R, Simmons D. Retention of patients in the 'Get Checked' free annual diabetes review program in New Zealand. *NZ Med J* 2008;121(1270):U2945.
6. Ministry of Health. Health Targets—Moving towards healthier futures, 2007/08. Wellington: Ministry of Health; 2007.
7. Ministry of Health and district health boards: Effectiveness of the 'Get Checked' diabetes programme. Performance Audit Report. Wellington: Office of the Auditor-General; 2007.
8. NZGG. Management of Type 2 diabetes. New Zealand Guidelines Group; December 2003.
9. Ellison TL, Elliott R, Moyes SA. HbA1c screening for undiagnosed diabetes in New Zealand. *Diabetes Metab Res Rev* 2005;21(1):65–70.
10. Morris AD, Boyle DI, MacAlpine R, Emslie-Smith A, Jung RT, Newton RW, MacDonald TM. The diabetes audit and research in Tayside Scotland (DARTS) study: electronic record linkage to create a diabetes register. DARTS/MEMO Collaboration. *BMJ* 1997;315(7107):524–8.
11. Joshy G, Devers M, Simmons D. The profile of diabetic patients in a rural town in New Zealand and the extent of aspirin use. Proceedings of the Waikato Clinical School Research Seminar, Thursday 1 September 2005. *N Z Med J* 2006;119(1231).
12. Scragg R, Maitra A. Asian health in Aotearoa: An analysis of the 2002/03 New Zealand Health Survey. The Asian Network Incorporated; 2005.
13. Ministry of Health. Asian Health Chart Book 2006. Public Health Intelligence Monitoring Report No 4. Wellington: Ministry of Health; 2006.
14. Hughes LO, Raval U, Raftery EB. First myocardial infarctions in Asian and white men. *BMJ* 1989;298(6684):1345–50.
15. Robinson T, Simmons D, Scott D, Howard E, Pickering K, Cutfield R, Baker J, Patel A, Wellingham J, Morton S. Ethnic differences in Type 2 diabetes care and outcomes in Auckland: A multiethnic community in New Zealand. *N Z Med J* 2006 Jun 2;119(1235):U1997.
16. Nixon D, Brown A, Preston K. Comparing clinical outcomes of diabetic patients in NZ and the UK. *NZ Fam Phys* 2007;34(6):413–8.
17. UKPDS Study Group. Overview of six years' therapy of Type II diabetes: a progressive disease (UKPDS 16). *Diabetes* 1995;44:1249–58.
18. Lindstrom J, Louheranta A, Mannelin M, Rastas M, Salminen V, Eriksson J, et al. The Finnish Diabetes Prevention Study (DPS): Lifestyle intervention and three-year results on diet and physical activity *Diabetes Care* 2003;26(12):3230–3236.
19. Smith M, Nixon D and Davies A. Addressing inequalities and improving health outcomes in patients at high risk of diabetes complications—a pilot project. *NZ Fam Phys* 2005;32(1):15–18.
20. Lawrenson RA, Dunn PJ, Worsley D, Williams S, Jenkin K. Discover diabetes: A community based screening programme for diabetic eye disease. *N Z Med J* 1994;107(977):172–4.
21. Reda E, Dunn P, Straker C, Worsley D, Gross K, Trapski I, Whitcombe S. Screening for diabetic retinopathy using the mobile retinal camera: the Waikato experience. *N Z Med J* 2003 Aug 22;116(1180):U562.

ACKNOWLEDGEMENT

We would like to thank the Hamilton East Medical Centre, Glenview Medical Centre and Fairfield Medical Centre and the Waikato Regional Diabetes Service for their support of this project. We would also like to acknowledge the funding from the New Zealand Heart Foundation for the summer studentship.

COMPETING INTERESTS

None declared.