The impact of patient and practice characteristics on retention in the diabetes annual review programme

Rawiri Keenan MBChB;[1] **Janet Amey** MSocSc (Hons);[1] **Ross Lawrenson** MBBS, MD, FRCGP, FFPH, FAFPHM[2]

[1] Midlands Health Network, Hamilton, New Zealand

[2] Department of General Practice and Primary Health Care, Waikato Clinical School, The University of Auckland, Hamilton, New Zealand

ABSTRACT

INTRODUCTION: Despite more than 10 years of the diabetes annual review (DAR) programme, ensuring the annual return of diabetic patients for review remains a challenge for primary care. Regardless of future arrangements for diabetes review programmes, regular review of patients remains clinically important.

AIM: To investigate the effect of patient and practice characteristics on the retention of patients continuously enrolled with the same practice in the DAR programme.

METHODS: We undertook a retrospective, observational study of a cohort of enrolled diabetic patients who had a DAR in the July 2006 – June 2007 reporting year and remained enrolled with the same practice for the following three years. Controlling for death and migration, retention rates were calculated for age, gender, ethnicity, rurality, practice funding type and practice nurse (PN) to general practitioner (GP) ratio.

RESULTS: The study included data from 78 practices and 6610 patients with Type 2 diabetes. Non-Maori and those aged 60 years and over were more likely to be retained in the programme. For practice factors, those with a higher PN to GP ratio had a significant retention advantage. Rurality and funding type was not shown to have a significant role in retention.

DISCUSSION: Results support the view that both patient and practice factors influence a patient's retention within the DAR programme. The PN to GP ratio may be an important factor in the retention of patients in a DAR programme and warrants further research and consideration when planning future primary care models.

KEYWORDS: Chronic disease; diabetes mellitus; general practice; nurses; primary health care; rural health

Introduction

The burden of Type 2 diabetes in New Zealand is well documented.[1] The New Zealand 'Get Checked' diabetes annual review (DAR) programme was implemented in 2000, aimed at improving clinical outcomes for patients with diabetes through a regular review.[2] Despite previous research looking at factors contributing to retention,[3,4] ensuring the annual return of people with diabetes for review remains a challenge for primary care. The Minister of Health announced in September 2011 that the DAR programme will be discontinued as it currently stands, with a new programme commencing in July 2012. Regardless of such programme-level change, regular review remains important for people with diabetes and, therefore, retention issues remain a measure of quality of care.

One useful indicator of quality of care is the percentage of eligible patients having had a DAR in any year. This cross-sectional method, however, does not account for patient migration or death

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CORRESPONDENCE TO:
Rawiri Keenan
Midlands Health Network, PO Box 983, Hamilton 3240, New Zealand
rawiri.keenan@midlandshn.health.nz

and identification of new patients with diabetes. A quality (or quality assurance) plan (QP) has been part of the Midlands Health Network (MHN, previously Pinnacle) for the last 14 years. The QP measurement of DARs is a cross-sectional analysis of practice performance over a financial year. In terms of instigating clinical change, audit and feedback through programmes such as the QP have been effective. However, the use of audit has not been universal and there is little evidence on how to use it effectively.[5] Generally, a longitudinal approach is superior to a cross-sectional one for investigating factors affecting quality.[6]

The MHN is one of the largest primary health organisations in the country, with general practices in the Gisborne, Taupo, Waikato and Taranaki regions. This network of 100 general practice teams is responsible for the primary care of almost 450 000 enrolled people. This includes approximately 17 500 patients with diabetes (2009/10), of which 12 756 (71%) had their DAR in that single year.[7] A prior study in the MHN of a subset of three practices showed that the practice recording of diabetes was complete and reliable.[8]

Previous work investigating retention has focused on the overall health system and patient. It has shown that once a patient with diabetes attends their second or third consecutive review, they are more likely to continue to participate year after year.[4] That study followed the patient cohort across practices and investigated the effect of patient factors such as age, gender and ethnicity on retention in the programme. This current study looked at retention rates within individual practices where the patient remained continuously enrolled. We aimed to look at the same patient factors specifically for MHN patients, as well as factors associated with the practice. The objective was to identify factors affecting retention rates over a four-year time period for the same cohort of diabetic patients enrolled with the same general practice.

Methods

This was a retrospective, observational study of a cohort of MHN enrolled diabetic patients who had a DAR in the July 2006 – June 2007 quality reporting year and remained enrolled with the same practice for the following three years, whether they had a subsequent DAR or not.

MHN collects data from member general practices for the purposes of payment for service and quality reporting. The data are collected from the practice patient management systems using clinical extracts and are held securely on MHN servers. All MHN staff, including any contracted staff, sign a confidentiality agreement on commencement of employment, ensuring the privacy of health data. The review was conducted as part of MHN quality assurance and continuous improvement. Exemption from ethics committee review was applied for and granted by the Northern Y Regional Ethics Committee (Ethics Ref. NTY/11/EXP/013).

A new 'retention dataset' was created through the combination of multiple datasets from the MHN data warehouse (specifically 'ever coded diabetic patients', 'get checked' and 'enrolled patients') and an updated 'mortality dataset' provided by the Ministry of Health. The datasets were linked by patient national health index (NHI) number. Aside from NHI number, any other identifying data were removed. Alongside the combined retention dataset were data from the 2009 MHN Workforce Census concerning general practitioner (GP) full-time equivalents (FTE) and practice nurse (PN) FTE per practice, practice rural ranking and practice funding type.[9]

The original dataset included 95 practices; 16 were excluded for a combination of data-related issues based around the compatibility of different patient management software, as well as practices that left or joined MHN over the period of interest. We also excluded patients with Type 1 diabetes, leaving 78 practices with 6875 individuals who were continuously enrolled according to our definition. A further group of 265 patients were excluded because of missing ethnicity data, taking the study population to 6610.

Although strictly speaking three DARs in three years is considered best practice, in order to reflect the realities of general practice, retention was defined as 'any individual from the 2006/07 cohort who attended two further reviews in the following three years'. Patient deaths and transfers out

*Table 1. Patient characteristics**

	Number	%
Ethnicity		
Non-Maori	5389	82
Maori	1221	18
Gender†		
Female	3319	50
Male	3289	50
Age		
≥60	4369	66
0–59	2241	34
TOTAL	**6610**	**100**

* All patients had at least one diabetes annual review
† Two missing gender data

of practices (even if captured in another MHN practice) over the four-year period were removed.

Using the above definition of retention, rates of patients having been 'retained' in the programme were calculated to investigate the effect of patient and practice factors on retention. Those factors investigated were patient age, sex and ethnicity, practice rurality, funding type, and ratio of PNs to GPs. Age was dichotomised to 0–59 years and ≥60 years and was calculated for the intial year (2006/07) from date of birth. Ethnicity was divided into Maori and non-Maori. The practice rurality was taken from the rural ranking scale, with those scoring over 35 points classed as rural and those scoring less classed as non-rural. The funding variable was dichotomised to those practices funded through the very low cost access (VLCA) system that operates in New Zealand and those that are not. The PN to GP ratio was divided into those practices with a ratio <1 and those ≥1.

Firstly, univariate statistical analysis was performed using common odds ratio (with 95% confidence intervals) to ascertain the significance of retention rates within the individual categorical variables. Secondly, all of the study variables (both practice and patient) were tested for overall significance in a logistic regression model, identifying the variables which had the most significant effect on retention in the DAR programme over time. All statistical analyses were performed using SAS version 9.2 software (SAS Institute Inc., Cary, NC, USA).

WHAT GAP THIS FILLS

What we already know: Diabetes is a major health burden. The New Zealand diabetes annual review programme creates a significant amount of work in primary care. Despite being established for many years, regular review still remains a difficult target to meet.

What this study adds: Regular review in a diabetes annual review programme is influenced by the patient, but attributes of the practice can also play a important role. Specifically, an increased or equal practice nurse to general practitioner ratio may improve the rate at which patients attend regularly.

Table 2. Practice characteristics

	Number of practices	%
Funding		
VLCA funding	34	44
Other funding	44	56
Rurality		
Rural	32	41
Urban	46	59
Practice nurse to general practitioner ratio		
≥1	38	49
<1	40	51

VLCA very low cost access (funding)

Results

Patient and practice characteristics

The ethnicity, gender and age-grouping of the 6610 patients included in the cohort are given in Table 1. Table 2 gives the split of practices by the three key characteristics investigated—funding, rurality and PN to GP ratio. Table 3 shows the findings on univariate analysis for retention rates by both patient and practice characteristics. Table 4 shows the significant outcomes from the logistic regression modelling.

Discussion

Our principal findings show that in investigating the patient and practice factors affecting retention

Table 3. Retention rates by specific patient and practice factors (univariate analysis)

	DAR in 2006/07* (n=6610)	Continuously enrolled† (n=5861)	Number retained‡	Total	Odds ratio	95% CI
Ethnicity						
Non-Maori	5389	4786	4200	88%	1.70‖	1.43–2.02
Maori	1221	1075	863	80%		
Age						
≥60 yrs	4369	3872	3501	90%	2.60‖	2.24–3.02
0–59 yrs	2241	1989	1562	79%		
Gender§						
Male	3289	2904	2516	87%	1.05	0.91–1.22
Female	3319	2955	2545	86%		
PN to GP ratio						
≥1	3406	2999	2625	88%	1.33‖	1.15–1.54
<1	3204	2862	2438	85%		
Rurality						
Rural	2469	2250	1978	88%	1.27‖	1.09–1.48
Urban	4141	3611	3085	85%		
Funding						
VLCA	2746	2460	2108	86%	1.10	0.94–1.27
Other	3864	3401	2955	87%		

VLCA very low cost access (funding)

* Patients with diabetes who had a diabetes annual review (DAR) in the 2006/07 year

† Patients with diabetes who remained enrolled with the same practice over the whole study period whether or not they had a further DAR

‡ Patients with diabetes retained in the DAR programme according to study definition

§ Two missing gender data

‖ Statistically significant result

within the DAR programme, the patient remains a key factor. Importantly though, we have shown there may be an association between practice factors and retention within that practice. Attributes of the practices could therefore also play an important role in retention overall.

Looking at retention within individual practices using a defined cohort is a new and novel way of investigating diabetes care for the MHN. Although there are methodological limitations with such a cohort approach, it is not without justification. One recommendation from the 2010 report from the Office of the Auditor-General was for agencies to consider carrying out further analysis, such as a cohort approach, using data collected in the DAR process with the aim to identify improvements that could be made.[10]

Table 4. Logistic regression (multivariate) modelling

	Odds ratio	95% CI
Age ≥60	2.44	2.08–2.84
PN to GP ratio ≥1	1.30	1.12–1.51
Non-Maori	1.41	1.18–1.70

GP general practitioner; PN practice nurse

The main strength of this study was the ability to look at patient retention using a 'new lens'. Investigating the practice and the role it plays in retaining patients has not been done in New Zealand before. Overseas studies have suggested that financial incentives, the uptake of clinical information technology, younger doctors and urban practices are potential organisational and practice factors that may improve quality of

care.[11,12] Using a study design that looks at patient and practice characteristics together in a multivariate model has allowed the factors of the most significance overall, covering both patient and practice, to be identified. Previously these were looked at separately in any research on DAR retention.[3,4,8,9,10,11] Combining them in this way also attempts to reflect the realities of general practice.

As the study is designed, it has enabled a large enough cohort to consider Maori versus non-Maori retention by age and a number of other factors. A weakness of this, though, was the grouping of all non-Maori diabetic patients together. Although data on Maori are of interest in investigating ways to reduce health inequalities, it is known that Pacific people in New Zealand and those from the Indian subcontinent have similarly poor health outcomes as Maori.[13,14] It is also documented that other ethnic minorities, such as Asian and Pacific people, have poorer retention in the DAR programme.[8] Overall, the numbers of Asian and Pacific patients are low in our cohort, though by grouping with all non-Maori, the true difference between Maori and European non-Maori may in fact be greater than shown here. Since this study is looking at retention within the programme and not outcomes, it is reasonable to group patients as has been done. Another weakness of this study is the 17 excluded practices. Our knowledge of the MHN data, and of the practices themselves, gives us no reason to suggest that these practices are any different from the ones included in our study.

Practice characteristics

Our study shows some evidence for further investigating the effects of staffing levels and organisation of general practice teams. This is of particular importance for future models of care currently being developed in New Zealand to cope with the rising health burden of diabetes. The ratio of 1:1 PN to GP was chosen from anecdotal evidence within the MHN of higher performance in those practices with more nurses. Our study had approximately a 50:50 split between the practices with a PN:GP ratio of 1:1 or more and those with less than this. Those practices with a high ratio of PN:GP were more effective at retaining their patients in this programme, supporting our anecdotal evidence. This result is also in keeping with European studies looking at multiple factors in quality of care, including practice nurse staffing.[14,15,16]

Potentially significant gains can be made in DAR and other areas of patient care if we look at current practice models and find ways to improve the organisation of general practice teams. As services are reconfigured to contain rising costs and reduce the current (and anticipated) burden on secondary care services, it is important that primary care is appropriately supported to play its role as effectively and efficiently as possible. The piloting of new models of primary care and planning for service configuration is underway in the MHN, making these issues of particular relevance in our network.

The rural ranking scale used in this study is a local, albeit arbitrary method of defining rural and non-rural practices.[18] Other practice factors were not found to be significant in the multivariate analysis. It was interesting though to see that rural practices in the univariate model were more likely to retain patients than urban ones. A study from the UK showed no difference in process factors between rural, remote and urban practices.[19] As with that study, the definition of rural was measured arbitrarily; here we used the rural ranking scale. The higher retention in rural practices when directly compared to urban practices in our study could be due to less patient 'churn', or practice staff personally knowing their enrolled patients. Anecdotal stories, such as of 'catching people' in the supermarket, are common from rural practice in New Zealand. However, we found that being a rural practice was not associated with improved retention rates in a multivariate analysis, after adjusting for age, ethnicity and PN to GP FTE ratio.

We investigated practice funding for two reasons. Firstly, it was possible that the workload of VLCA practices and their high needs population created a difference in retention. Also, VLCA funding can be an approximation of the social deprivation of a practice population. Practice eligibility for VLCA funding is determined by ethnicity and the deprivation level of the area its enrolled patients live in (as measured by the New

Zealand Deprivation Index[21]). Separating the effects of ethnicity is difficult and the deprivation score of patients would perhaps have been a more exact factor; but, nevertheless, VLCA provided a useful proxy for our study.

Patient characteristics

Patient characteristics affecting diabetes care in New Zealand have been described previously.[3] Joshy et al.[4] showed older and non-Maori patients were more likely to have regular diabetes review. In the MHN, and arguably across the country, the ethnicity of a patient has always, anecdotally at least, been thought of as the main characteristic affecting that patient's retention. This shows that while ethnicity is important, age is the most significant variable. Gender made no impact on the retention rates, although women in New Zealand in general have been shown to be more likely to visit the doctor than men.[20]

Our results show that patient factors play a strong role in affecting a patient's likelihood of being retained in an annual review programme. The results, however, do support the idea that practice factors can play an important role. The PN to GP ratio featured strongly and is something that needs to be considered when planning practice organisation in the future. Overall, there is a continual need to focus on the review of younger and Maori patients, while continuing to acknowledge the role of the practice in determining the care patients receive. We expect this to remain true as the MHN transitions from the current diabetes 'Get Checked' programme to the Diabetes Care Improvement Package which commenced in July 2012.

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COMPETING INTERESTS
Rawiri Keenan and Janet Amey are employed by the Midlands Health Network.

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