

A patient-centred clinical approach to diabetes care assists long-term reduction in HbA1c

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ABSTRACT

INTRODUCTION: Patient-centred care has proven to be cost-effective, with a positive impact on health outcomes. A patient-centred approach is recognised as a desirable component of diabetes care.

AIM: The aim of this audit was to determine if the specific patient-centred intervention offered by a clinical service (GPSI Diabetes service) improves diabetes care, as measured by changes in glycosylated haemoglobin (HbA1c).

METHODS: The GPSI Diabetes service is a community-based service, run by a general practitioner with a specific interest (GPSI) in diabetes, and a practice nurse. Adults with diabetes are referred to the service by their general practitioner (GP) and care is provided using a set of loosely structured diabetes-specific patient-centred approaches. Following a series of visits, patients are discharged back to their GP. Baseline HbA1c was recorded at intake and for two years after discharge from the service. Patient and GP satisfaction questionnaires were also completed.

RESULTS: New Zealand (NZ) Europeans and Māori with Type 2 diabetes and Type 1 diabetes experienced immediate and sustained (two-year) improvements in HbA1c. At intake, baseline HbA1c for Māori was higher than that of NZ Europeans. However, following this patient-centred intervention, this difference was reduced. None of the returned GP or patient questionnaires contained negative feedback, although the patient response rate was low.

DISCUSSION: A patient-centred clinical approach to diabetes can contribute to significant and sustained reductions in HbA1c. This clinical approach is potentially reproducible in other clinical settings and could also be applied to the management of other chronic conditions.

KEYWORDS: Chronic disease; clinical audit; diabetes mellitus; patient-centered care; self-management

Introduction

A patient-centred approach for diabetes care is currently recommended.^{1,2,3} Although introduced as a concept over 40 years ago,⁴ patient-centred medicine was not formally conceptualised for clinical use until the mid-1980s.⁵ In 1995, *Patient-Centered Medicine: Transforming the Clinical Method* by Stewart et al.,⁴ placed this model of care at the epicentre of clinical practice internationally.

Patient-centred medicine recognises the uniqueness of an individual's disease, life commitments,

leisure activities and personal illness experience due to culture, beliefs and previous experiences with the disease.⁶ To provide patient-centred care, a clinician must relinquish the role of 'decision maker' and shift to that of 'educator', ensuring that each patient acquires sufficient understanding of their disease and management options to allow them to make fully informed decisions around their own disease management.²

Patient-centred care has proven to be cost-effective, with a positive impact on health outcomes.^{7,8} However, while patient participation in decision-making processes may be desirable, there is a lack

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of evidence on how best to achieve this in a busy clinical setting.⁹

The General Practitioner with Specific Interest (GPSI) Diabetes service translates the six components of a patient-centred model⁴ into a clinical approach for diabetes care. The purpose of this audit is to determine if this patient-centred intervention improves diabetes care, as measured by glycosylated haemoglobin (HbA1c), in a convenience sample of patients with diabetes in a primary care setting in New Zealand. HbA1c is widely accepted as a barometer of success in diabetes management because of its association with disease progression and complications.¹⁰⁻¹⁴

Methods

This audit comprised a before-and-after assessment of 185 patients referred to a patient-centred intervention for diabetes management between 2008 and 2010.

Intervention

GPSI Diabetes is run by a vocationally trained general practitioner (GP) and practice nurse (PN). It is community-based, held two half-days a week, and funded by the local district health board which is responsible for 150 000 (25% Māori; 3% Pacific) people, mostly residing in small towns (populations <70 000).¹⁵

All attendees have diabetes, are at least 18 years old and are referred by their GP. Each patient attends a series of 30-minute appointments held weekly, and are then discharged back to their GP. The number of appointments attended is determined by patient need.

Diabetes care is provided within the framework of a patient-centred medical model.⁴ A set of loosely structured diabetes-specific patient-centred approaches were created to ensure consistency in the provision of the six interactive components of the model.

To maximise reproducibility of this service and its outcomes, an explicit description of our patient-centred approach to diabetes is provided. The six components are:

1. Establishing roles and expectations
2. Establishing a common language
3. Education
4. Finding 'common ground'
5. Selecting management regimens
6. Empowering for long-term self-management.

Establishing roles and expectations

It is explained to the patient that they will be participating in management choices to ensure diabetes care fits in to their life; and that this approach likely differs from previous experiences, where a management regimen was prescribed with the expectation that they would fit their life around it.

Establishing a common language

By explaining the need for a shared language around diabetes, a discussion on diabetes pathophysiology can be initiated without insulting the patient's current understanding. This also enables correction of patient misconceptions, opportunity for the provider to gain insight into the patient's knowledge base and, ultimately, allows provision of the information the patient needs for management decisions.

Education

For sound decision-making, a patient must be fully informed. Thus, education includes a review of normal glucose metabolism; the pathophysiology of diabetes, with explanations of all underlying pathologic mechanisms (e.g. insulin resistance, pancreatic failure, excessive liver gluconeogenesis, gut endocrine dysfunction); the similarities and differences between different types of diabetes; and disease progression. Treatment options are reviewed: diet and exercise; oral and injectable medications, their mechanisms of action, pharmacokinetics, side effects, and the disadvantages and advantages of each. The information is presented so that patients understand how different options address different disease pathologies, how they work together synergistically and how their use may predetermine certain lifestyle choices. All medication treatment options are presented, regardless of whether the medication attracts a government subsidy.

Education also includes what HbA1c actually measures (i.e. glycosylated haemoglobin) and how its value provides prognostic information for disease complications. Patients are not told 'you must get your blood sugar down'. They are simply given the same information health care providers have that support glycaemic control.

Patients are taught how pre- and post-prandial blood sugars determine treatment needs and/or dose adjustments; and to enable informed dietary decisions, nutritional education focuses on how different food types differentially affect blood sugar.

Information is evidence-based and all patients receive the same information. However, how and in what order the information is presented is different for each patient, due to different levels of understanding and the need to address each patient's primary concerns.

Finding common ground

Establishing each person's motivator for self-management is essential for long-term success. Finding common ground⁴ requires the provider to take the time, perhaps several appointments, to establish concordance between a patient's life goals and the provider's goal of reducing HbA1c. For most, explaining HbA1c and how it predicts personal risk of diabetes-related complications is sufficient. However, sometimes, finding common ground requires the provider to explore and understand each patient's values, beliefs, motivations and life commitments, so that reasons for improving diabetes management can be presented as a means of improving some aspect of the patient's life that is deemed important to them.¹⁶⁻¹⁸ Only when concordance is established are patients discharged from the service.

Selecting management regimens

Explicit information on how each medication differentially effects change in HbA1c is provided. For anyone choosing insulin, the concepts of flexible, semi-flexible and fixed regimens are presented. Importantly, it is the patient who decides how flexible an insulin regimen they would like. Insulin titration is done via telephone

WHAT GAP THIS FILLS

What we already know: A patient-centred approach to chronic disease management is cost-effective, with a positive impact on health outcomes. However, there is a lack of information and evidence on how best to achieve a patient-centred approach within current clinical settings.

What this study adds: This audit demonstrates that principles of a patient-centred model of care can be successfully translated to diabetes management within a primary care setting, as evidenced by sustained improvements in blood glucose control. This approach, which can potentially be translated into other clinical settings, could have important implications for the clinical management of other chronic conditions.

and patients have 24-hour telephone access for decision-making support.

Empowering for long-term self-management

Each patient is given a strategy for focused self-monitoring, which includes a set of parameters that signal management deterioration, instructions for medication titration, and when to contact their GP. A discharge letter is sent to the referring GP detailing the patient's management choices and emphasising the patient's ability to participate in all decisions around future diabetes care. A copy of this letter is sent to the patient.

Statistical analysis and questionnaires

HbA1c, an accepted measure of diabetes care,¹⁴ was the primary clinical outcome measure in this study. Baseline HbA1c for each patient was noted on referral. Following discharge from the service, laboratory databases were used to monitor HbA1c at three-monthly intervals for two years. HbA1c values pre- and post-clinical intervention, and differences between Māori and European New Zealanders were analysed using paired *t*-tests (SPSS Version 17.0.2; 2009; IBM SPSS Inc., Chicago, IL, USA). Additional cardiovascular parameters (e.g. cholesterol, blood pressure) were not included, as permission to access patient medical records had not been obtained.

Questionnaires were used to assess patient and GP satisfaction with the service. GPs were sent a questionnaire six months after the patient was

Table 1. Patient referral and attendance patterns

Ethnicity	All referrals n (%)	Type 1 diabetes			Type 2 diabetes		
		n	DNA	% DNA	n	DNA	% DNA
NZ European	115 (62)	47	3	6	68	3	4
Māori	48 (26)	10	4	40	38	9	24
Pacific	7 (4)	1	1	100	6	0	0
Other*	15 (8)	4	0	0	11	0	0
Total	185 (100)	62	8	13	123	12	10

DNA Did not attend

* 11 Indian; 4 Asian

returned to their care. This questionnaire asked two questions:

1. Did you feel the GPSI Diabetes service was beneficial to your patient?
2. Would you use the service again?

The questionnaire also provided the opportunity for feedback comments.

Patients completed questionnaires at discharge and again six months later. The patient questionnaires asked two questions:

1. Do you feel your understanding of diabetes management has improved?
2. Do you feel you are better able to manage your diabetes?

The patient questionnaire also provided the opportunity for feedback comments. Questionnaires were anonymous, distributed and collected by non-clinical staff, and accompanied by a self-addressed pre-paid envelope. As this study was a clinical audit, ethics approval was not required.

Results

Of the 185 referrals, 66% were for people with Type 2 diabetes (Table 1). Most referrals were for 'poor diabetes control' (Table 2). Twenty referred patients did not attend (DNA); four due to pregnancy or illness. The DNA rate was highest for the initial appointment; once a person attended, the DNA rate was low (2 of 16 DNAs). Māori were over-represented in the DNAs (Table 1).

Regardless of diabetes type, the average number of visits for each patient was 4.5, completed over six to eight weeks.

Type 2 diabetes

The average decrease in HbA1c was 18 mmol/mol ($p<0.001$) for NZ Europeans, and 22 mmol/mol ($p<0.001$) for Māori (Table 3, Figure 1). This decrease seen in HbA1c was maintained throughout the two-year period following discharge from the service. Baseline HbA1c at intake for Māori was 21 mmol/mol higher than baseline HbA1c for NZ Europeans ($p<0.001$). However, following this clinical intervention, this ethnic disparity was reduced and no longer statistically significant. Pacific, Indian and Asian people experienced similar decreases in HbA1c and these were maintained during the two-year follow-up period; small numbers precluded statistical analysis.

Type 1 diabetes

Most referrals (76%) were for NZ Europeans (Table 1). Their HbA1c decreased by

Table 2. Reasons for referral to the service

Reason for referral	n*	%
Poor control of diabetes	155	76
Frequent hypoglycaemia	10	5
Request for insulin start	20	10
Patient request	12	6
New diagnosis	7	3

* Some patients were referred for more than one reason

Table 3. Type 2 diabetes: mean HbA1c at intake and two years following discharge from the service

	NZ European (n=65)	Māori (n=29)	Pacific (n=6)	Other* (n=11)
	HbA1c (ΔHbA1c) mmol/mol	HbA1c (ΔHbA1c) mmol/mol	HbA1c (ΔHbA1c) mmol/mol	HbA1c (ΔHbA1c) mmol/mol
Baseline	79	100	110	71
Post discharge				
3 months	63 (-17) [†]	77 (-23) [†]	85 (-25)	66 (-5)
6 months	64 (-16)	77 (-23)	97 (-13)	68 (-3)
9 months	62 (-18)	75 (-25)	93 (-17)	79 (+8)
12–15 months	59 (-21)	87 (-13)	92 (-18)	65 (-6)
18–24 months	62 (-18)	73 (-27)	82 (-28)	66 (-5)

ΔHbA1c Change in HbA1c from baseline

* 9 Indian; 2 Asian

† $p < 0.001$

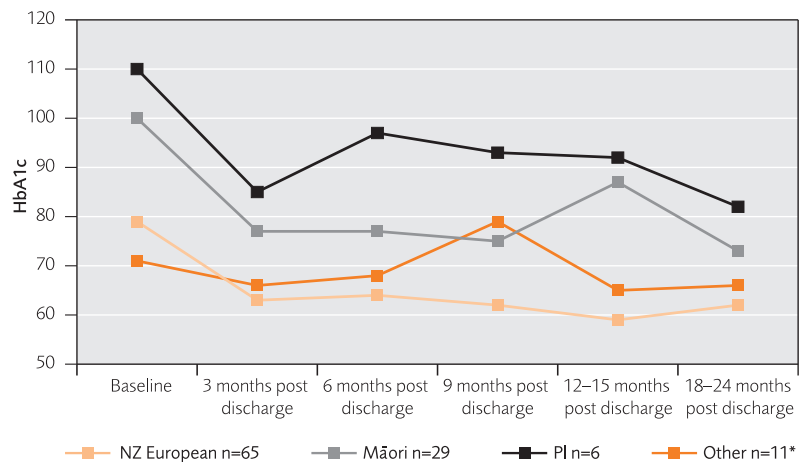
17 mmol/mol ($p < 0.001$) and this decrease was maintained throughout the two-year period following discharge (Table 4, Figure 2). Māori and Indian patients experienced reductions in HbA1c of 31 mmol/mol and 15 mmol/mol, respectively and these were maintained during the two-year follow-up period; small numbers precluded statistical analysis. As seen in patients with Type 2 diabetes, baseline HbA1c for Māori with Type 1 diabetes was higher than baseline HbA1c for NZ Europeans ($p < 0.005$); and, again, this difference was reduced following the clinical intervention. Again, small numbers prevented statistical analysis.

Questionnaires

Thirty-two GPs were sent questionnaires; 31 were returned. All responses indicated the service was beneficial to their patient and that they would use it again. Comments were unanimously supportive, with no negative comments made.

At discharge, 162 of 165 (98%) patients completed questionnaires. All indicated an increased understanding of diabetes and better self-management. The majority (72%) of patient comments contained the words 'gained understanding/knowledge/insight/confidence', 'more informed' and/or 'empowered'. There were no negative comments made. Six months after discharge, 55 (33%) of the 165 questionnaires mailed were returned. All indicated ongoing in-

Figure 1. Type 2 diabetes: mean HbA1c at intake and for two years following discharge from the service



* 9 Indian; 2 Asian

creased understanding of diabetes and 53 (96%) indicated that their diabetes self-management continued to be better than previously. There were no negative comments.

Discussion

This audit demonstrates that the patient-centred approach described can achieve significant and sustained reductions in HbA1c. NZ European and Māori with Type 2 diabetes experienced decreases in HbA1c close to 20 mmol/mol, while

Table 4. Type 1 diabetes: mean HbA1c at intake and two years following discharge from the service

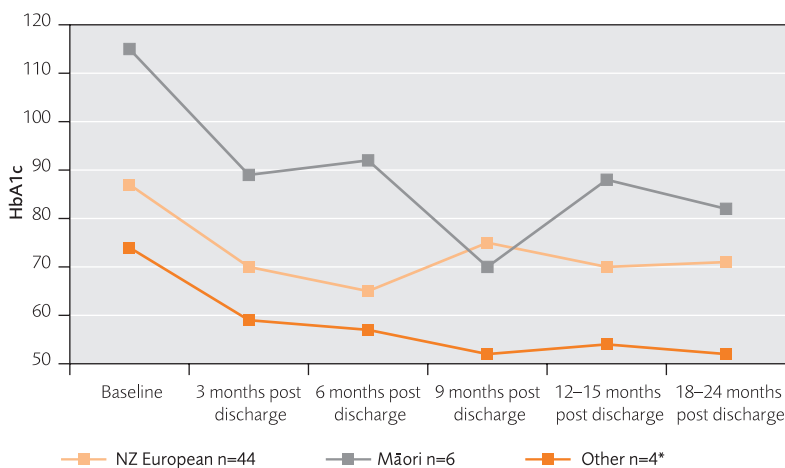
	NZ European (n=44)	Māori (n=6)	Other* (n=4)
	HbA1c (ΔHbA1c) mmol/mol	HbA1c (ΔHbA1c) mmol/mol	HbA1c (ΔHbA1c) mmol/mol
Baseline	87	115	74
Post discharge			
3 months	70 (-17) [†]	89 (-26)	59 (-15)
6 months	65 (-22)	92 (-23)	57 (-17)
9 months	75 (-12)	70 (-45)	52 (-22)
12–15 months	70 (-17)	88 (-27)	54 (-20)
18–24 months	71 (-16)	82 (-33)	52 (-22)

ΔHbA1c Change in HbA1c from baseline

* 2 Indian; 2 Asian; the one Pacific person referred did not attend

† $p < 0.001$

Figure 2. Type 1 diabetes: mean HbA1c at intake and for two years following discharge from the service



* 2 Indian; 2 Asian

† $p < 0.001$

those with Type 1 diabetes had a decrease of over 10 mmol/mol. Furthermore, these improvements were maintained throughout a two-year follow-up period, without further intervention from the service.

The closing of the HbA1c gap between NZ European and Māori patients seen following intervention, while statistically significant, should be interpreted with caution due to small numbers. This reduction in ethnic disparity reflects the

cultural competence of a patient-centred approach where each patient chooses their own management regimen to suit their own life.

Targeted glycaemic control in diabetes has become somewhat controversial, due to recent uncertainties around the health benefits of intensive glycaemic management.^{3,11} Indeed, for Type 2 diabetes, aggressive management of other cardiovascular risk parameters (e.g. hypertension) likely provides greater benefit.³ Nevertheless, guidelines³ continue to recommend sustained blood glucose control to reduce disease complications,^{10–14} lower medical costs,¹² and decrease work absenteeism.¹⁹

Achieving long-term blood glucose control within real-world clinical settings has proven to be difficult.^{20,21} The few clinical interventions that have produced long-term reductions in HbA1c were costly, due to the number of staff needed to support the intervention and the large amounts of staff time needed to maintain improved outcomes.²² This contrasts with the experience of the GPSI Diabetes service, where patients attended a limited number of visits (average 4.5 visits) for short periods of time (six to eight weeks).

Several key ingredients within this patient-centred intervention may have contributed to the sustained reductions in HbA1c observed following the intervention. The first is education for the purposes of creating a well-informed patient. Patient understanding has the strongest inde-

pendent effect on self-management behaviour.²³ However, importantly, provision of knowledge was not based on what the provider believed the person should know, but was guided by the patient's behaviour, beliefs, and what was meaningful to them. It is well documented that education individualised to patient needs produces behavioural changes, while provision of knowledge based on providers' perspectives does not.^{16,24,25} Interestingly, DNAs for the service were low (2 of 16 DNAs) once a person had attended the first appointment, suggesting attendees experienced the patient-centred education as respectful, meaningful and practical, while previous experiences with non-patient-centred diabetes care were possibly a barrier to attending.

A second key ingredient of the GPSI Diabetes service was the succession of closely scheduled appointments. This facilitated rapid acquisition of knowledge and skill, resulting in immediate improvements, not just improvements in clinical indices (e.g. blood glucose).

A third key ingredient was the emphasis placed on finding 'common ground'.⁴ Only when concordance between a patient's life goals and the provider's goal of reducing HbA1c was achieved were patients discharged from the service.

The fourth key ingredient was the emphasis placed on ensuring that each patient acquired the necessary skills for successful ongoing self-management. Every patient was discharged not only with the knowledge and skills for day-to-day disease management, but also with a set of personalised management guidelines for recognising when things were not going well, for initiating timely management changes, and knowing when to seek assistance.

The systematic use of all of these specific patient-centred components guaranteed that every individual experienced all the key ingredients, contributing to the success of the service as a whole.

Limitations of this audit include its reliance on HbA1c as a measure of intervention success; monitoring other cardiovascular risk parameters would have provided a better understanding of the long-term health benefits of this inter-

vention. Also, there was no analysis of which medications were used during management escalation; a predominance of insulin introduction for patients with Type 2 diabetes could bias results toward success. However, this does not explain the sustained changes in HbA1c. Strengths of this audit include its detailed description of methods and key ingredients, facilitating the translation of this patient-centred approach into other clinical settings.

It is well documented that education individualised to patient needs produces behavioural changes, while provision of knowledge based on providers' perspectives does not

In conclusion, the GPSI Diabetes service provided a patient-centred approach that resulted in clinically significant reductions in HbA1c that were sustained for at least two years after a patient left the service. A stepwise prescribed approach accommodated individualisation of care within a structured health care setting, and the detailed description of the approach will facilitate translation into other clinical settings. In addition to using patient-centred principles, this service used 30-minute appointments clustered weekly, and a partnership approach between a GP and a PN. These features differ considerably from hospital-based clinics and usual general practice care. The true test of success for this model will be the ability to replicate the outcomes when translated into different settings and delivered by other providers. In addition, a randomised controlled trial with the inclusion of multiple cardiovascular risk parameters would clarify the long-term health benefits of such a service. Should this substantiate current findings, it would suggest that health care providers would do well to rearrange appointment schedules to accommodate the key ingredients of this model. Finally, diabetes, as one of the more complex chronic illnesses requiring self-management, has become a model for the management of other chronic diseases.²⁶ Should this patient-centred model be reproducible, then it could also potentially be applied to the management of other chronic conditions.

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COMPETING INTERESTS

Janet Titchener is the Clinical Director of the GPSI Diabetes service. The data collection and statistical analysis were completed by individuals with no affiliation to the GPSI Diabetes service.