

Do multidisciplinary care plans result in better care for patients with type 2 diabetes?

BACKGROUND

Since the introduction of the Enhanced Primary Care package, care plans have become part of Australian general practice. Previous research has focused on barriers to the uptake of care plans. This study examined the effect of multidisciplinary care plans on provision and outcome of care for patients with type 2 diabetes.

METHODS

A retrospective before/after medical record audit design was chosen. Subjects of the study were general practitioners practising in Southwest Sydney (New South Wales) and their diabetic patients who had written care plans. Outcome measures were frequency and results of glycosylated haemoglobin, blood pressure, foot, serum lipids, weight, and microalbumin checks.

RESULTS

The medical records of 230 patients were audited. Following the care plan, adherence to diabetes guidelines increased. Metabolic control and cardiovascular risk factors improved for patients who had multidisciplinary care implemented.

DISCUSSION

Whether the improved diabetes care shown here is attributed to improved teamwork and/or coordination of care needs further research.

Type 2 diabetes is a common and important chronic illness that is estimated to affect 150 million people worldwide. It is expected that this number will double by 2025.¹⁻² In Australia, diabetes affects 7.5% of the adult population.³ Diabetes is a condition predominately managed in general practice.⁴ Increasingly this is under shared care arrangements with specialist diabetes services using a multidisciplinary team approach.⁵⁻⁷ Wagner⁸ described the multidisciplinary team as 'a team comprising diverse health care professionals who communicate regularly about the care of a defined group of patients and participate in that care on a continuing basis'. A care plan is 'a written, comprehensive, and longitudinal plan of action that sets out the health care needs of a patient and the type of services and supports needed to meet those needs.⁹ It is a tool for communication and coordination of care within a multidisciplinary team. This is important in diabetes care because comorbidity is common,¹⁰ and referral to other health providers is low relative to their needs.¹¹⁻¹²

In November 1999, the Australian government introduced the Enhanced Primary Care (EPC) package. This initiative

specifically remunerates general practitioners involved in developing multidisciplinary care plans for patients with chronic conditions and multidisciplinary care needs.¹³ To qualify for a payment from Medicare, a care plan must involve at least two care providers other than the GP. In July 2005, the Commonwealth government modified the EPC plans into two types of care plans: one for chronic disease care managed by the GP, and one for patients who require multidisciplinary care.¹⁴ The latter is similar to the care plans that this study evaluated.

The introduction of the EPC package was a major reform that formally incorporated care planning into the Australian health care system. However, there has been limited research on the efficacy of multidisciplinary care plans as an intervention to improve chronic disease management. Previous research has identified problems in acceptability and uptake of care plans but has not examined their impact on chronic disease care.¹⁵⁻¹⁷

The aim of this study was to evaluate whether multidisciplinary EPC planning for patients with type 2 diabetes was associated with improved provision of multidisciplinary care; and whether process and outcomes of care were closer to national guidelines for diabetes care¹⁸ following the preparation of the EPC plan.

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Methods

The study used a retrospective medical record audit to describe the provision and outcomes of diabetic care in the year before and after the preparation of a care plan. A tool was developed for the clinical notes review. This was based on national guidelines for the process and outcomes

of diabetes care.¹⁸ The tool collected data on the process and outcome measures in the year before and after the care plan including: frequency, dates and results of glycosylated haemoglobin (HbA1c), eye, body mass index (BMI), blood pressure (BP), foot, serum lipids, and urinary microalbumin checks, and visits to GPs and other health care providers.

(New South Wales) (845) were invited to participate in the study. Nonresponding GPs were reminded by telephone within 1 week of the initial invitation. General practitioners were eligible if they had performed any care plans for their diabetic patients. Participating GPs identified potentially eligible patients by examining their billing records for care plan Medicare items. Patients of these GPs were eligible if they had type 2 diabetes diagnosed at least 1 year before the care plan, had a written care plan performed between November 2000 and March 2003 and had received care from the GP for at least 1 year before and after the care plan. Participating patients provided informed written consent to the audit of their medical records.

Enhanced Primary Care plans can be performed for patients with any chronic illness requiring multidisciplinary care. However, the study examined the impact of care plans on diabetes care. Therefore, for the purpose of this study, multidisciplinary care was classified as being met for diabetes care if the patient was seen by at least two care providers other than the GP and at least one of these was diabetes related (eg. podiatrist, diabetes educator, dietician, endocrinologist, ophthalmologist, optometrist).

All GPs practising within the five divisions of general practice in southwest Sydney

Continuous measures summarised as mean for the 12 month period before and after the care plan were compared using paired sample t-test. Categorical data were compared using 2x2 contingency tables and the significance of change tested using McNemar test for paired data. The last values of all outcome measures except BP were compared before and after the care plan to give maximum time between the initiation of the care plan and the measurement of the outcome. As the BP can vary substantially between measurements, the means of all systolic

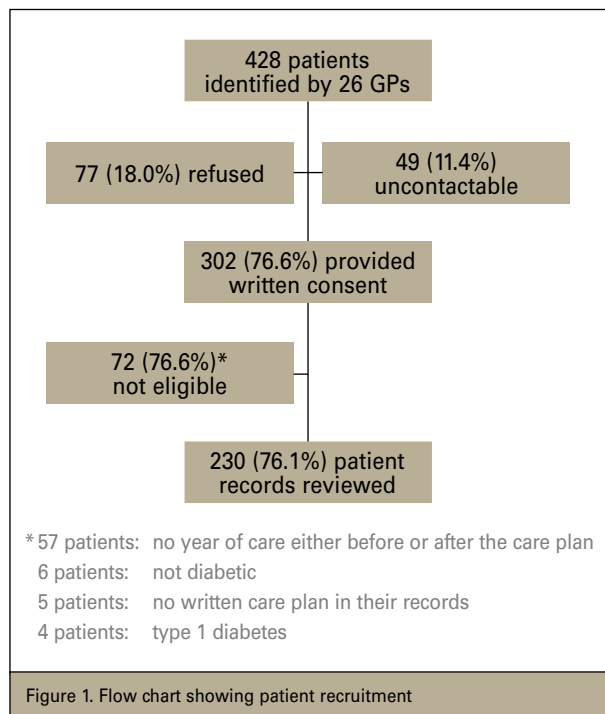


Table 1. Paired samples t-test showing change in number of care providers involved in patient's care and number of visits to care providers before and after the care plan (N=230)

	Mean before care plan	Mean after care plan	Means difference	p
Mean number of care providers visited				
All care providers*	1.93	2.49	0.55 (95% CI: 0.30–0.80)	<0.01
Diabetes related care providers**	0.92	1.35	0.44 (95% CI: 0.26–0.61)	<0.01
Mean number of visits to care providers				
General practitioners	12.47	13.23	0.76 (95% CI: 0.04–1.55)	0.06
All care providers*	2.95	4.03	1.07 (95% CI: 0.62–1.53)	<0.01
Visits to a diabetes related care provider**				
Podiatrists	0.07	0.15	0.08 (95% CI: 0.03–0.13)	<0.01
Diabetic educators	0.25	0.41	0.16 (95% CI: 0.04–0.28)	<0.01
Dieticians	0.07	0.21	0.15 (95% CI: 0.06–0.23)	<0.01
Endocrinologists	0.27	0.43	0.16 (95% CI: 0.05–0.27)	<0.01
Ophthalmologists/optometrists	0.49	0.69	0.20 (95% CI: 0.06–0.34)	<0.01
Total visits to all diabetes related care providers	1.15	1.89	0.74 (95% CI: 0.45–1.02)	<0.01
* Excluding GPs				
** Podiatrist; diabetes educator; dietician; endocrinologist and ophthalmologist/optometrist				

Table 2. Adherence to process of care guidelines before and after the care plan

	N	Met process guidelines before the care plan		Met process guidelines after the care plan		p
		n	%	n	%	
HbA1c check ¹	230	213	92.6	220	95.7	0.2
Weight check ²	230	57	24.8	80	34.8	<0.01
Blood pressure check ³	230	12	5.2	7	3.0	0.3
Foot check ⁴	230	55	23.9	76	33.0	0.02
Serum lipids check ⁵	159*	114	71.7	119*	74.8	0.6
Microalbumin check ⁶	230	142	61.7	174	75.5	<0.01

1) glycosylated hemoglobin checks every 6–12 months for patient not on insulin and every 3–6 months for patients on insulin; 2) 3 monthly; 3) every visit; 4) every 6 months; 5) if normal every 1–2 years, if abnormal or on treatment every 3–6 months; 6) annually
* Excluding nondyslipidaemic patients

Table 3. Adherence to outcomes of care guidelines before and after the care plan

	N	Met outcome guidelines before care plan		Met outcome guidelines after care plan		p
		n	%	n	%	
Adherence to outcome guidelines for all patients who had documented data for both pre and post care plan periods						
HbA1c ¹	213	86	40.4	99	46.5	0.07
BMI ²	160	20	12.5	19	11.9	1.00
Blood pressure ³	219	137	62.6	163	74.4	<0.01
Total cholesterol ⁴	206	153	74.3	164	79.6	0.16
Urinary microalbumin ⁵	107	75	70.1	66	61.9	0.05
Adherence to outcome guidelines for patients who met study's definition of multidisciplinary care in the year following the care plan*						
HbA1c ¹	136	38	27.9	54	39.7	<0.01
BMI ²	110	12	10.9	13	11.8	1.0
Blood pressure ³	141	84	59.6	106	75.2	<0.01
Total cholesterol ⁴	129	93	72.1	109	84.5	<0.01
Urinary microalbumin ⁵	62	41	67.2	37	60.7	0.34

* Seen by at least two care providers other than GP in the year following the care plan and at least one of these was diabetes related care provider (diabetes educator, dietician, podiatrist, endocrinologist and ophthalmologist/optometrist)
1) glycosylated hemoglobin equal to or less than 7.0%; 2) body mass index ≤ 25 ; 3) BP $<140/90$ mmHg; 4) total cholesterol ≤ 5.5 mmol/L; 5) microalbumin <20 $\mu\text{g}/\text{min}$ timed or <20 mg/L spot

and diastolic BPs were compared in the year before and after the care plan. Statistical Package for Social Sciences (SPSS) software was used for data analysis.

The inter-rater reliability between the two auditors was examined in two participating practices where both auditors reviewed the same medical records and agreement rate assessed for 29 key outcome measures. The agreement rate ranged between 80–100%.

The University of New South Wales Human Research Ethics Committee approved the study.

Results

Patient and GP response

Invitation letters were sent to 845 potentially eligible GPs practising in southwest Sydney. Thirty-eight percent (326/845) of GPs were not available by telephone. Of the 519 available GPs, 42% (218/519) indicated they had not performed any care plans. Of the 301 remaining GPs, 16.6% (47/301) provided written consent of whom 13 GPs were excluded as their care plans had data missing which was necessary for the analysis

of outcomes (eg. date of the care plan). Two withdrew, and six GPs who worked in large or corporate practices could not get approval to participate from their head office, leaving 26 GPs who identified patients for the project.

Of the 26 GPs who identified patients, 84.6% were men; 30.8% were aged 35–44 years, 42.3% 45–54 years, 26.9% were 55 years of age or more; and 61.5% have been in general practice for 20 years or more.

The 26 participating GPs identified 428 potentially eligible patients. The records and care

Table 4. Paired samples t-test showing change in outcome of care measures before and after the care plan

Outcome measures for all patients (N=230)				
	Mean before care plan	Mean after care plan	Means difference	p
HbA1c	7.43	7.31	0.12 (95% CI: -0.03–0.27)	0.1
Weight	85.90	86.00	-0.15 (95% CI: -0.81–0.51)	0.7
Systolic BP	135.82	134.11	1.71 (95% CI: 0.40–3.01)	0.01
Diastolic BP	79.51	78.40	1.11 (95% CI: 0.39–1.83)	<0.01
Total cholesterol	4.87	4.71	0.16 (95% CI: 0.04–0.29)	0.01
Outcome measures for group of patients who met study's definition of multidisciplinary care* in the year following the care plan (N=146)				
	Mean before care plan	Mean after care plan	Means difference	p
HbA1c	7.75	7.37	0.38 (95% CI: 0.21–0.54)	<0.01
Weight	86.47	86.29	0.17 (95% CI: -0.63–0.99)	0.7
Systolic BP	136.50	134.38	2.12 (95% CI: 0.52–3.70)	<0.01
Diastolic BP	79.49	78.30	1.19 (95% CI: 0.23–2.07)	<0.01
Total cholesterol	4.98	4.69	0.28 (95% CI: 0.13–0.44)	<0.01

* Seen by at least two care providers other than GP in the year following the care plan and at least one of these was diabetes related care provider (diabetes educator, dietician, podiatrist, endocrinologist and ophthalmologist/optometrist)

plans of 230 patients were reviewed (*Figure 1*). The mean age was 61.2 years (SD: 11.4), 50.4% (116/230) of participants were men and the mean duration of diabetes was 6.7 years (SD: 6.1).

Provision of multidisciplinary care

There was a significant increase in the mean number of all care providers and diabetes related care providers seen and mean number of visits to these providers in the year following the care plan (*Table 1*). Following the care plan, more patients were involved in multidisciplinary care for diabetes as defined by the study (110, 47.8% before vs. 146, 63.5% after; $p < 0.01$).

Adherence to process of guidelines

There was a significant increase in the number of patients who met process of care guidelines after the care plan in relation to weight, foot and urinary microalbumin checks. It was not possible to assess adherence to guidelines regarding eye checks because patients were followed up for 1 year before and after the care plan, whereas guidelines require a retinal check every 1–2 years (*Table 2*).

Adherence to outcome of guidelines

There was a significant increase in the number of patients who met BP outcome guidelines in the year following the care plan.

When patients who met the study's definition

of multidisciplinary care in the year following the care plan were selected as a group, there was a significant increase in the number of patients who met HbA1c, BP and total cholesterol outcome guidelines after the care plan (*Table 3*).

Change in outcome measures

Total cholesterol and BP improved significantly in the year following the care plan, while other measures including HbA1c did not show significant improvement. However, for the group of patients who met the study's definition of multidisciplinary care after the care plan, there was a significant improvement in HbA1c, systolic and diastolic BP, and total cholesterol (*Table 4*).

Discussion

This study provides evidence that a care plan is followed by increased provision of multidisciplinary care for diabetic patients. A care plan may prompt a comprehensive review of the patient's diabetes and referrals to other health professionals. As there is evidence that current referral rates are low^{11–12} there is potential benefit in this outcome. This is consistent with results of previous research that shows a combination of multidisciplinary care and other professional interventions improves the provision of care.^{7,19–20}

Following the care plan, care provided adhered significantly more closely to process guidelines in relation to weight, foot and

microalbumin examinations. There was a high level of adherence to process guidelines for the measurement of HbA1c even before the care plan. The process of care guidelines¹⁸ require measuring the BP at every visit. Poor adherence to BP process guidelines may be a reflection of the difficulty adhering to this requirement. The improvement in HbA1c level observed in the group of patients who met the study's definition for implementation of multidisciplinary care has substantial clinical as well as economic implications as research in the United States has shown cost saving with improved metabolic control in type 2 diabetes.²¹ However, some of the other changes such as BP control were relatively small and may be of limited clinical significance.

There are limited previous studies on the effectiveness of multidisciplinary care plans as an intervention to improve care in chronic disease. A South Australian study that involved patients with type 2 diabetes showed improvement in health outcomes, service utilisation and goal achievement but specific diabetes care outcomes were not examined.²² We therefore believe our study is the first to show an association between care plans and improved provision and outcome of diabetes care.

We acknowledge that the before and after study design is not a high level of evidence and other temporal effects or interventions such

as the effect of GPs' participation in a register, recall and reminder system²³ could explain the changes observed. Other study designs were not feasible. At the time of the project in May 2003, the EPC package had been available for 4 years and a substantial number of care plans had been performed. A controlled study was therefore impractical due to the problem of finding a suitable control group.

Difficulty recruiting GPs was an important issue. One reason for this was many GPs were not eligible. Examination of the Medicare data²⁴ on southwest Sydney identified that an average of only 22.5% of GPs were remunerated for preparing care plans per quarter during the period covered by the study. However, the relatively small number of participating GPs and the uncontrolled nature of the study need to be borne in mind when generalising our findings.

The sources of data used in this study were the written care plans and GP held medical records, however, there are concerns related to completeness and accuracy of medical records as a source of information on care provided in a general practice consultation.²⁵

An advantage of the retrospective design was that it enabled us to review a substantial number of patient records including a cycle of care for a 1 year period before and after the care plan. We acknowledge the potential for missing data, both because of the retrospective design and our reliance on what was found in the patients' medical records. Nevertheless, by reviewing not only progress notes, but also health providers' letters and pathology results, we believe we were as comprehensive as possible. Inter-rater reliability between the two auditors showed a high agreement rate.

The study findings suggest to clinicians and policy makers, at least in the management of diabetes, that there is value in continuation of care planning. It does not tell us however, how care planning compares to other interventions in terms of efficacy and cost effectiveness.

Our study suggests that multidisciplinary care, when implemented, is associated with improved patient outcomes. If this finding is due to multidisciplinary care plans, we do not know if this is because the care plan promoted a more comprehensive review of diabetes care and acted as a prompt for more referrals to

other care providers (ie. more structured care), or whether this was due to improved teamwork and coordination of care, or both. A prospective study is needed to explore this question. Such a study would need to include measures of communication, care coordination and teamwork as well as measures of structured care.

Implications for general practice

- There has been lack of evidence on the benefits of the care plans.
- The study shows an association between care plans and improved diabetes care.
- There is value in continuation of care planning but there is a need for further research to define the elements of the process that are effective.

Conflict of interest: none declared.

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